January 17, 1871.

Professor Newton, F.R.S., V.P., in the Chair.

The Secretary read the following reports on the additions to the Society's Menagerie during the month of December 1870:—

The total number of registered additions to the Society's Menagerie during the month of December 1870 was 57, of which 1 was by birth, 12 were by presentation, 31 by purchase, 1 by exchange, and 12 were animals received on deposit. The total number of departures during the same period, by death and removals, was 89. Amongst the additions the most remarkable were:—

1. An example of the Amphiuma (*Amphiuma means*), purchased, Dec. 6th, of a dealer, and probably from one of the Southern States of North America. The Society have previously possessed two specimens of this animal, which were living in the Gardens from 1858 to 1861*.

2. A Praslin Parrakeet (*Coracopsis barklyi*, E. Newton, P. Z. S. 1867, p. 346, pl. xxii.), received in exchange Dec. 13th, being the second example of this rare Parrot acquired alive by the Society.

3. An example of Erxleben's Monkey (*Cercopithecus erxlebeni*, Dahlb. et Puch.), purchased Dec. 17th, and believed to be the first example of this rare and beautiful Monkey ever acquired by the Society. This species has been well figured by Dahlbaum in his 'Studia Zoologica' (plate v. fig. 12). The original describers were not acquainted with its exact locality. The present specimen, however, is certainly from some part of the West-African coast.

4. An example of the likewise rare Pluto Monkey (*Cercopithecus pluto*, Gray, P. Z. S. 1848, p. 56, Mamm. pl. iii.), purchased along with the last-named animal.

5. A small Tortoise of the genus *Podocnemis* from the Upper Amazons, purchased Dec. 16th, and certainly referable to *P. unifilis* of Troschel (Schomb. Guian. iii. p. 647). Mr. Edward Bartlett, who has met with this species in the same district, informs me that his specimens of it in the British Museum have been referred to the young of *P. dumeriliana*. This, I think, can hardly be correct. But I shall have some further remarks to make on this subject in some notes, which I have in preparation, on the Tortoises living in the Society's Gardens.

6. A Piping Guan (*Pipile cumanensis*)† purchased Dec. 20th, having been obtained by Mr. H. A. Wickham during his recent voyage down the river Cassiquiare. The bird was unfortunately in poor condition, and lived but a few days, but was of interest as being the only example of this species received alive by the Society for many years.

On concluding my series of reports upon the additions to the Society's Menagerie for the past year, I beg leave to take this oppor-

* Two Amphiumas were purchased of Mr. Jamrach, Sept. 3, 1858. One died March 3, 1861, and the second May 1, 1861.

† Sel. et Salv. P. Z. S. 1870, p. 529.

tunity of calling the attention of the Meeting to the register of accessions to the Menagerie now lying on the table. In it will be found the English and scientific name, sex, and locality, so far as these are ascertainable, of every vertebrated animal received alive by the Society, together with information as to how it was obtained, whether by presentation, purchase, or otherwise. A corresponding register is kept of all the deaths that occur in the Society's Gardens, and of the mode in which the bodies are disposed of. This lies also on the table. Both these registers, which are kept at the Superintendent's office in the Gardens, are, I need hardly say, at all times open to the inspection of the Fellows of the Society, or of any other person interested in them. Moreover, in order to give greater publicity to the list of arrivals, a copy of them is published every week in the 'Field' newspaper.

From the earliest days of the Society's existence it has been the practice to keep a register of "arrivals and departures" in the daily journal of "occurrences," as it is termed, prepared by the Superintendent. Ever since the day when I had the honour of becoming Secretary of the Society, the register of accessions has always been carefully revised every month and an abstract of it printed in the 'Proceedings.' This was at first done month by month*; but it was thought afterwards to be more convenient to give the list of additions for the year continuously, so that since 1862 it has been printed entire as an "Appendix" to the yearly volume of 'Proceedings.' At the same time it has been my constant practice (as those here, who have so often had to listen to me, must be fully aware) to bring before the scientific meetings such notices as seemed to be requisite of all the more remarkable additions to the Society's collection, so as to call immediate attention to every accession of special interest. I have likewise edited and published four editions of the list of Vertebrated Animals in the Society's Gardens, and am now engaged in preparing a fifth edition, which will contain a register of every accession received up to the close of last year, and thus form a complete record of all the animals that have been living in the Society's Gardens during the past ten years.

I have been induced to trouble the meeting with these remarks, because in the last number of the 'Annals of Natural History'† a Fellow of the Society has assured the public that no proper record is kept of the living animals received in the Society's Gardens. How such a statement can have been made in the face of the facts above stated, I am not able to explain.

Mr. Howard Saunders exhibited a series of skins of birds of the genus *Aquila*, and made the following remarks on them:—

"Before commencing the exhibition of this formidable array of

* See P. Z. S. 1859, p. 212, where the first of these lists (for May of that year) is given.

† Ann. Nat. Hist. ser. 3. vol. vii. p. 15.

Eagles, I wish to state that they have been examined by Mr. J. H. Gurney, Canon Tristram, Dr. Jerdon, and Mr. H. E. Dresser, and that their views on the subject coincide with my own, also that I have brought with me no specimens which do not immediately bear on the question. In addition to those lent by some of these gentlemen, I am indebted to Lord Lilford for the most important links in the chain of evidence which I have to bring forward.

"Although few Eagles exhibit more marked characters than the adult *Aquila imperialis* (of Cuvier, Gould, and Schlegel, = *A. mogilnik* of Gmelin and Latham), yet a great amount of confusion exists respecting it and some of its congeners in immature plumage.

"It will perhaps be best to begin by showing the different stages of the bird as observed in Europe.

"Thoroughly identified birds taken from the nest near Seville early in June 1869, by Lord Lilford, and still living in his aviary, were, when I saw them in a tawny plumage, certainly somewhat darker than Nos. 1 and 2, but still so light that several good ornithologists at the time pronounced them to be *A. nævioides*. Due allowance must be made for the burning sun of Spain on those before me; the result of which is clearly shown in No. 2, which is a bird hatched the same year as No. 1, but killed in February 1870 instead of October 1869.

"No. 3 is a still older bird.

"No. 4 shows the connecting-link of the tawny bird passing into the dark stage; the centre barred feather in the tail coming out above the uniform old feathers.

"No. 5. Leads up to

"No. 6. Adult female shot from her eggs.

"No. 7. I take to be a somewhat older male.

"So far as regards Spanish specimens, which as a rule exhibit a good deal of white on the carpal joints, and rather less on the scapulars than birds from the east of Europe and Asia Minor; this, however, varies not only with age, but with the time of year. I once possessed a Spanish Imperial Eagle with a great deal of white on one scapula and hardly any on the other. All the eastern specimens are adults; but Mr. Cullen, of Kustendje, writes word that all young Imperials there are tawny, and never *striated*.

"True *A. imperialis* at no time exhibits a striated plumage with white bars on the wings as in the Indian specimens now before us; yet these birds have been set down by many Indian naturalists as *A. imperialis*, and similar specimens in the British Museum from Nepaul are labelled *Aquila mogilnik*—the latter a hideous name; but the European bird has a prior claim to both. Mr. Allan Hume, in his 'Rough Notes of a Naturalist,' describes the stages we have here, but unfortunately omits the fourth, or adult stage, which I have not been able to obtain from India. I do not mean to say that *true A. imperialis* may not occur in India; nor do I say that this bird, when adult, may not have white scapulars; but I do contend that this bird is *not* true *A. imperialis*, but the *Aquila bifasciata*, as figured in Gray and Hardwicke's 'Ill. Ind. Zool.' vol. i. pl. 17. At pl. 28, vol. ii., the

same species is again figured as *Aquila imperialis* ♀ ; and this has been the probable source of the error. So far *bifasciata* is a very good name for the Indian bird. The young bird of this species was obtained by Mr. Tristram near Lebanon, its most western known occurrence.

"I may remark that there is a great difference in the cry of these two species, that of *A. nœvioides* being a yelp, whereas that of *A. imperialis* is a *hoarse* bark, not unlike that of the adult Great Black-backed Gull (*Larus marinus*).

"Major Irby first drew my attention to these Eagles; and an examination of Lord Lilford's birds, and of the sterna of many of these birds now on the table, confirmed the views which he suggested. For the loan of the sterna I have to thank Prof. Newton.

"Seeing that these two species run so close, it is impossible to say what many of the isabelline-coloured birds in Spanish museums may be; but at least we have *one* authentic specimen of *A. nœvioides* here. I have hitherto no *knowledge* of its breeding in Spain, though I think it not improbable.

"Like some better ornithologists than myself, I at one time confused *A. nœvioides* with *A. clanga*, a specimen of which I now exhibit to show how totally distinct they are, the affinities of the latter being with *A. nœvia*, of which it appears to be little more than a larger race.

"The peculiarity in *A. nœvioides* when adult is that the feathers are half of one colour, half of another; but in the young this is not so."

Mr. J. E. Harting, F.Z.S., exhibited and made remarks on a specimen of the so-called Sabine's Snipe (*Scolopax sabini*) in the flesh, recently killed. This bird was usually regarded as a melanoid variety of the Common Snipe (*Gallinago gallinula*); but Mr. Harting was not quite certain whether this view was correct.

Mr. Sclater exhibited a typical example of *Ateles variegatus*, Wagner (Säugeth. v. p. 78), collected on the Serra de Cocoi, on the Upper Rio Negro, by the late Johann Natterer, on the 9th of February 1831, which he had received in exchange from the Imperial Cabinet of Vienna, and pointed out its unquestionable identity with *A. bartletti* of Gray, as already stated by him (P. Z. S. 1871, p. 668, and Ann. Nat. Hist. ser. 3, vol. vi. p. 472).

Some extracts were read from a letter addressed to the Secretary by Dr. R. Brown, of Campster, F.R.G.S., concerning the best method of destroying poisonous Serpents, in reference to the discussion at the last Meeting upon this subject. Mr. Brown suggested the introduction of domestic Pigs into localities infested by Serpents, and stated that the plan had been successful in various parts of America where he had resided.

"For instance, no locality in the State of Oregon was more the haunt of the deadly Rattlesnake (*Crotulus lucifer*) than the valleys of Columbia River—a locality well known to all readers of the

adventures of the early fur-traders on the Pacific slopes of the Rocky Mountains. Indeed, for some time after settlers came to that part of the country, so troublesome were the Snakes that they would even enter the houses and get under the beds. All efforts to lessen their numbers proved futile until Pigs became common in that part of the country. These Pigs were turned loose in the "oak-scrub" to feed on the acorns of the *Quercus garryana*, and generally to root about. From that day the reign of the Rattlesnake was on the wane; and now so few are they in this locality that though I stayed there for about a fortnight, continually roaming about the country on foot on botanical excursions, for a radius of six or seven miles, I do not remember even seeing one. It was not until I got beyond the range of the Pigs that they again began to be common. Between the Pigs and the Snakes there seems to be a natural antipathy. The moment a Pig sees a Snake it rushes upon it, grunting loudly; and before the Serpent can strike, it plants its foot on the Snake's head, crushing it, and then devours it. A Snake makes off immediately on the approach of a Pig; and so well do the Indians know of this antipathy, that I have often seen the women come to the settlers, begging for a piece of fresh Pig's skin to wrap around their ankles when gathering berries in the bush as a preventative against being bit by Rattlesnakes. This was in Southern Oregon, in Rogue-River valley; but the same belief (for which I doubt not there exists some good foundation in experience) is very widely spread. The Pig, it is said, is proof against the poison of the Rattlesnake. This I cannot certify as true, as I never had an opportunity of putting the assertion to the test. It may be, however, that the thick layer of fat in the Pig prevents the watery poison from reaching the more vital parts and so entering the larger blood-vessels."

M. Jules Verreaux, C.M.Z.S., made the following remarks on the colouring-matter of the wing-feathers of certain Touracoes, in reference to a discussion which had taken place at the previous Meeting:—

"Comme il a été question, dans la dernière séance de la Société, d'un fait assez intéressant sur le coloration des plumes de l'aile du genre *Corythaix*, permettez-moi que je viens vous soumettre quelques-unes des observations qu'il m'a été permises de faire durant mes longs voyages dans le sud de l'Afrique déjà en 1818, lorsque j'accompagnais au Cap de Bonne-Espérance feu mon oncle Delalande. J'observais dans le canton nommé Knysna un grand nombre du *Corythaix albocristata* de Strickland, et je remarquai que pendant les pluies diluviennes qui durèrent plusieurs jours, ces oiseaux qui habitent d'ordinaire la sommité des grands arbres, descendaient sur les branches basses, et cherchaient dans les lieux les plus touffus un refuge contre l'intensité de la pluie, mais je remarquais aussi qu'à ce moment leur plumage était tellement imbibé d'eau qu'ils ne pouvaient voler. Etant parvenu, après bien de la ruse, à m'emparer d'un sujet que j'avais saisi par l'aile, et qui m'échappa, quelle fut ma surprise de voir l'intérieur de ma main colorée en rouge comme du sang, mais qui disparut aussitôt le lavage. Ce fait m'ayant paru des plus curieux,

ainsi qu'à mon oncle, il fut convenu que nous chercherions à nous en procurer de nouveaux, ce qui eu lieu quelques jours après, la pluie n'ayant pas cessé pendant une huitaine de jours. Ainsi donc, nous étant livrés, ainsi que plusieurs de ses chasseurs à la recherche de ces oiseaux, nous ne tardâmes pas à nous convaincre que leur vol devenait impossible par l'imbibition des plumes et nous fûmes assez heureux pour en saisir trois exemplaires dans un état parfait de santé, sauf le tremblement causé par l'immersion, mais qui cessa dès que leurs plumes furent séchées. Nous renouvelâmes l'expérience que le hasard m'avait fourni, et pendant que les plumes étaient mouillées, nous n'eûmes aucune peine à les décolorer par le frottement, et à les rendre d'une rose pâle, surtout en les imbibant avec de l'eau de savon, car alors elles devenaient presque blanches. Mais ce qui nous surprit le plus, fut de voir cette même coloration rouge vif revenir dès que l'oiseau était complétement séché. Nous avons renouvelé cette opération deux fois par jour, et chaque fois nous avons eu le même résultat.

"L'expérience que j'ai faite moi-même sur d'autres espèces de la même famille, me prouve que toutes les plumes rouges sont pourvues d'une matière colorante qui s'efface en grande partie lorsque ces oiseaux sont exposés pendant longtemps à l'injure de l'eau, car sur le nombre que j'en ai pris ou tués, j'en ai remarqué un bon nombre dont la décoloration était presque complète, mais reparaissait toujours dès que l'oiseau était séché. Ce que je dis ici pour le genre *Corythaix* s'applique également au genre *Trogon*, qui comme les Touracos, possède un plumage dont la texture est tellement délié, que la pluie y produit le même effet. J'ai remarqué surtout sur l'espèce africaine, le *Hapaloderma narina*, que la belle coloration rouge du ventre était susceptible de décoloration pendant l'imbibition, et qu'alors ces plumes étaient roses, mais que, comme pour les Touracos, la vive coloration rouge reparaissait aussitôt que les plumes étaient sèches. Depuis mon retour en Europe, j'ai fait extraire des plumes de Touracos de diverses espèces la matière colorante, qui se détache, du reste, très-facilement dans de l'alcali, et qui au dire de plusieurs chimistes, pourrait servir avantageusement pour la toilette des femmes qui voudraient raviver leurs couleurs, et n'aurait pas l'inconvénient de rider la peau comme le font en général les matières minérales qu'elles emploient."

Mr. Sclater called the attention of the meeting to a letter from Prof. Baird, published in a recent number of 'Land and Water' (Dec. 31, 1870, p. 483), according to which and to Prof. Cope's note (Proc. Acad. Sc. Phil. 1868, p. 276) the so-called Axolotls, of which specimens were in the Society's Gardens, and about the development of which into Salamanders of the genus *Amblystoma* so much has been said and written*, would appear, after all, to be not the true *Siredon mexicanus* of the lake of Mexico, but the larvæ of *Amblystoma mavortium*, which had been named by Baird *Siredon lichenoides*.

This appeared to have been well known to the late Prof. Duméril,

* *Cf.* Günther, P. Z. S. 1868, p. 319; and Tegetmeier, P. Z. S. 1870, p. 160.

who had correctly determined the species (*cf.* Nouv. Arch. d. Mus. ii. p. 265). But so long as the true Axolotl of the lake of Mexico (*Siredon mexicanus*) was never known to undergo any metamorphosis, it seemed to be too soon to arrive at one of the conclusions put forward by Prof. Duméril (*l. c.* p. 291) that the name *Siredon* must be altogether suppressed. No *Amblystoma* was known, according to Prof. Baird, to which *Siredon mexicanus* could possibly be referred.

The following papers were read :—

1. On the Skeleton of a Narwhal (*Monodon monoceros*) with two fully developed Tusks. By J. W. Clark, F.Z.S.

[Received January 17, 1871.]

In March 1869 I obtained for the Museum of Zoology and Comparative Anatomy at Cambridge, through the kindness of Professor Reinhardt of Copenhagen, a complete skeleton of an adult Narwhal, with both tusks fully developed. It had been brought to Copenhagen from Greenland a few weeks before by one of the officers of the Danish establishments there, and reached me in a very rough state, just as it had been hastily cleaned in the first instance. The skeleton is complete, with the exception of the pelvic bones, and measures from the central point of the tail-flukes to the ends of the maxillaries 14′, of which the skull occupies 22″. The greatest breadth of the skull across the squamosals is $16\frac{3}{4}$″. Of the tusks the right measures 6′ 1″ in length, and $8\frac{3}{4}$″ in girth at the outer edge of the socket; the left 6′ 7″, with a girth of $9\frac{1}{2}$″. The tusks are $2\frac{1}{4}$″ apart at their origin, but diverge until they are $17\frac{1}{2}$″ apart at their tips. The shorter tusk has evidently been accidentally broken, possibly after the capture of the animal; had it not been for this unfortunate circumstance, they would have been as nearly as possible of equal length. The sex was not stated; but there can be but little doubt that the skeleton is that of a male.

There are four excellent papers on the dentition of the Narwhal—by Mulder *, G. Vrolik †, Reinhardt ‡, and Jäger §. The first two being in Dutch, and the third in Danish, they are little known. I owe a translation of Reinhardt's to the kindness of Professor Flower; of Vrolik's I have had one made. I regret that I could not obtain one of Mulder's; but as it chiefly relates to the dentition of the young Narwhal, it less concerns my present purpose. Vrolik and Reinhardt both treat of bidental skulls; and so does Jäger to a certain extent.

* Claas Mulder, "Over de tanden van den Narwal," &c. in Tijdschrift voor natuurlijke Geschiedenis, D. ii. 1835.

† G. Vrolik, "Nieuw Voorbeeld van twee uitgegroeide Stoottanden aan denzelfden Narval Schadel," in Bijdrage tot de Dierkunde, D. i. 1849.

‡ "Nogle Bemærkninger om Narhvalens Stödtand," Naturhist. Foren. Vidensk. Meddelelser for 1862.

§ Dr. G. Jäger, "Berichtigung einer Angabe Cuvier's," &c. in Jahreshefte des Vereins für vaterländische Naturkunde in Wurtemberg: Stuttgart, 1851.

These authors have so thoroughly investigated the subject, that any value my paper may possess will be due to the fact of its introducing their views to English readers.

The skulls of the toothed Whales are generally asymmetrical, being twisted more or less, usually towards the left. This peculiarity is especially observable in *Monodon*. One would expect it to be greatly exaggerated in the skulls of the males, where the left tusk alone is developed, and the left maxillary is in consequence very large, and the right proportionately small. But it does not seem to be affected by the absence or presence of teeth. Female skulls, where neither tusk is developed, are equally twisted; and so are the bidental skulls (fig. 1, p. 46), so far as I have been able to observe them, with the exception of the one at Amsterdam, which, if Vrolik's figure is correct, is twisted far less than any of the others. The increased size of the right maxillary does not appear to affect the rest of the skull.

The normal dentition of the adult Narwhal is as follows:—In the male the left tusk alone is developed, while the right remains abortive in its alveolus. This closes over it so as to leave no external trace of the existence of a tooth within it. In the female both tusks remain abortive, like the right tusk in the male. The developed tusk measures usually, in an adult, about 98″ in length (of which 14″ are concealed within the alveolus), and is 8″ in girth at the outer edge of the maxillary. It is spirally striated in a direction from right to left; and frequently the body of the tooth is twisted upon itself in a spiral*, the direction of which is also sinistral. There are generally five or six turns of the spiral, which become gradually further and further apart as they approach the tip of the tooth, extending to within 6″ or 7″ of the point in a tusk of average length. The extremity is without spiral markings. Scoresby† notices that the striated portion is usually grey and dirty, the extremity clean and white; and of one taken in his Greenland voyage he remarks‡, "the tooth was covered, over the greater part of its surface, with a greasy substance, forming a blackish-brown incrustation. The underside of the horn, however, and a few inches of the point were quite clean, white, and polished." Anderson §, in a very graphic passage, compares the discoloured portion to the scabbard of a sword, so strong is the contrast between the grey and white portions.

I have carefully compared my bidental specimen with several normally developed Narwhal skulls in which the alveoli of the teeth have been laid open; and I find that the alveolus of the tooth or teeth is hollowed out in the maxillary alone, and in no other bone whatever. Hence Cuvier ‖ is wrong in saying that the alveolus is

* Three such are preserved in the Museum of the Royal College of Surgeons, Nos. 2535, 2536, 2540; and in almost every museum, or shop where Narwhal ivory is sold, tusks so twisted may be seen. It may therefore almost be regarded as a normal form. For the dentition given above see Owen, 'Odontography,' p. 348.

† Arctic Regions, i. p. 490.

‡ Greenland, p. 133.

§ Nachrichten von Grönland, &c., p. 202.

‖ Oss. Fossiles, v. pt. i. p. 322.

"common to the maxillary and intermaxillary," or contained "in the intermaxillary only" *, a mistake which F. Cuvier has copied †. The wall of the alveolus is so thin on the underside in a full-grown animal that it chips off in maceration (fig. 2).

It has been asserted that the tusk of the Narwhal may be developed indifferently on the right side or on the left. This view was originally advanced by the two Cuviers and Lacépède ‡, and has since been brought forward again by Meckel § and Rapp ‖, and more recently by Lilljeborg, who, in his paper on the Scandinavian Cetacea, says, "the long and sharp tusk, which is generally in the left side of the upper jaw, is spiral to the left. The spiral ridges run to the left, even when the tusk is in the right side of the upper jaw" ¶. In the Swedish original of the paper the passage runs as follows:—"The tusk, when on the right side of the upper jaw, has its spiral dextrorsal, instead of sinistrorsal" **. It was to controvert this statement that Reinhardt wrote his paper.

An examination of the ground of this assertion introdnces us to the most fruitful of all sources of error in descriptions of the Narwhal, namely, erroneous figures. It is based on the woodcut given by Blasius ††, in which the right tusk is undoubtedly developed, with a dextrorsal spiral, and with the skull twisted towards the right instead of towards the left. But a careful examination shows, as Reinhardt points out, that Blasius has borrowed his Cetacean illustrations in general from G. Cuvier, from Brandt and Ratzeburg, and from F. Cuvier—and this one in particular, on a slightly reduced scale, from the last author, who has himself taken it from his brother's work, without observing that his engraver has reversed it in making the copy, the right side appearing as the left, and *vice versâ*. The same mistake has been made by Owen ‡‡, in borrowing Sir E. Home's figure; and by Pander and D'Alton §§. In figures of the entire animal the spiral is as often dextral as sinistral; but these are, one and all, so full of errors of every sort that we need not stop to consider them more particularly ‖‖.

It is true that the testimony of Fabricius may be advanced in

* Ibid. p. 321. Comp. also 'Règne Animal,' ed. 1829, i. p. 292.

† Histoire des Cétacés, p. 230.

‡ Lacépède (Cétacés, p. 147), "Elle (la dent) est située au côté droit ou au côté gauche de la mâchoire supérieure." G. Cuvier (Oss. Foss. v. p. 321), "Dans le mâle il n'en sort ordinairement qu'une des deux (dents), le plus souvent celle du côté gauche." F. Cuvier (Cétacés, p. 237), "La defense . . . . qui se trouverait tantôt au côté droit, tantôt au côté gauche."

§ Meckel, 'Vergleichende Anatomie,' ed. 1829, iv. p. 516.

‖ Rapp, 'Die Cetaceen,' p. 46.

¶ Lilljeborg, 'Scandinavian Cetacea,' ed. Ray Society, p. 244.

** Reinhardt, *l. c.*

†† Säugethiere Deutschlands, p. 525, fig. 282. Compare G. Cuvier, 'Ossemens Fossiles,' v. plate xxii.; Brandt and Ratzeburg, 'Medizinische Zoologie;' and F. Cuvier, 'Cétacés,' plate 17. fig. 3.

‡‡ Odontography, plate 87. fig. 1. Compare Sir E. Home, 'Lectures on Comparative Anatomy,' ii. pl. 42.

§§ Skelette der Cetaceen, p. 2, tab. v. fig. *a* and *b*.

‖‖ Compare, for instance, the figure in Trans. Roy. Soc. 1813, plate vii. fig. 2.

favour of this view; for he says, in his 'Fauna Grœnlandica*, "De maxilla superiore, latere alterutro, jam dextro, jam sinistro, prostat dens prælongus." That he should have made such a mistake is ingeniously accounted for by Reinhardt, who argues that, as Fabricius resided in the south of Greenland, at Narksalik in Frederikshaab district, whereas the Narwhal rarely appears south of the 65th parallel, it is highly probable that he never saw one alive, or even a skull, the tusk being the only part of the animal that was preserved in those days.

The statement of Fabricius is, so far as I know, utterly unsupported. I have never seen a Narwhal skull with a tusk on the right side, nor heard of a single well accredited instance of such a skull having been seen by others. One instance alone is mentioned in the whole literature of the subject; and that, though resting on the testimony of Pallas, must be received with caution. He states† that he saw at the British Museum in London a Narwhal skeleton, 12′ long, with a tusk, 4′ in length, on the right side of the skull. Pallas is generally so accurate, and in this particular case is so precise in giving the measurements of the specimen referred to, that one cannot help feeling sure that he is writing from notes and not from memory. Otherwise the length of time, nearly fifty years ‡, that intervened between his visit to London and the publication of the 'Zoographia,' coupled with the fact that the specimen cannot now be found, and that no record has been preserved of its existence, would suggest that a mistake had been made. As the case stands I confess that I feel disposed to accept Pallas's statement as accurate, and to regard the remarkable specimen he saw as a unique divergence from the rule. On the other hand, Scoresby § never saw a tusk on the right side of the head; and Reinhardt ‖, who in his position at Copenhagen has had singular opportunities of studying the Cetacea, says that during the past thirty years he has examined as many Narwhal skulls, and never found a tusk on the right side.

I may take this opportunity of correcting a statement of Owen's, which at first sight would seem to favour the existence of a tooth on the right side. In his description of a Narwhal skull in the Hunterian Collection, No. 2525, he remarks, "The left tusk is, in this instance, abortive," implying that the right is developed ¶. On reference to the skull, however, it appears that he has mistaken the right side for the left, as so many of his predecessors have done; for it is perfectly normal in all respects.

Although there is no evidence in support of the development of a

* Ed. 1780, p. 30.

† "In alio sceleto, quod Museum Britannicum habet, duodecimpedali, dentem unicum quadripedalem in dextro alveolo, alterum alveolum plane oblitteratum vidi." (Zoographia Rosso-Asiatica, i. p. 296.)

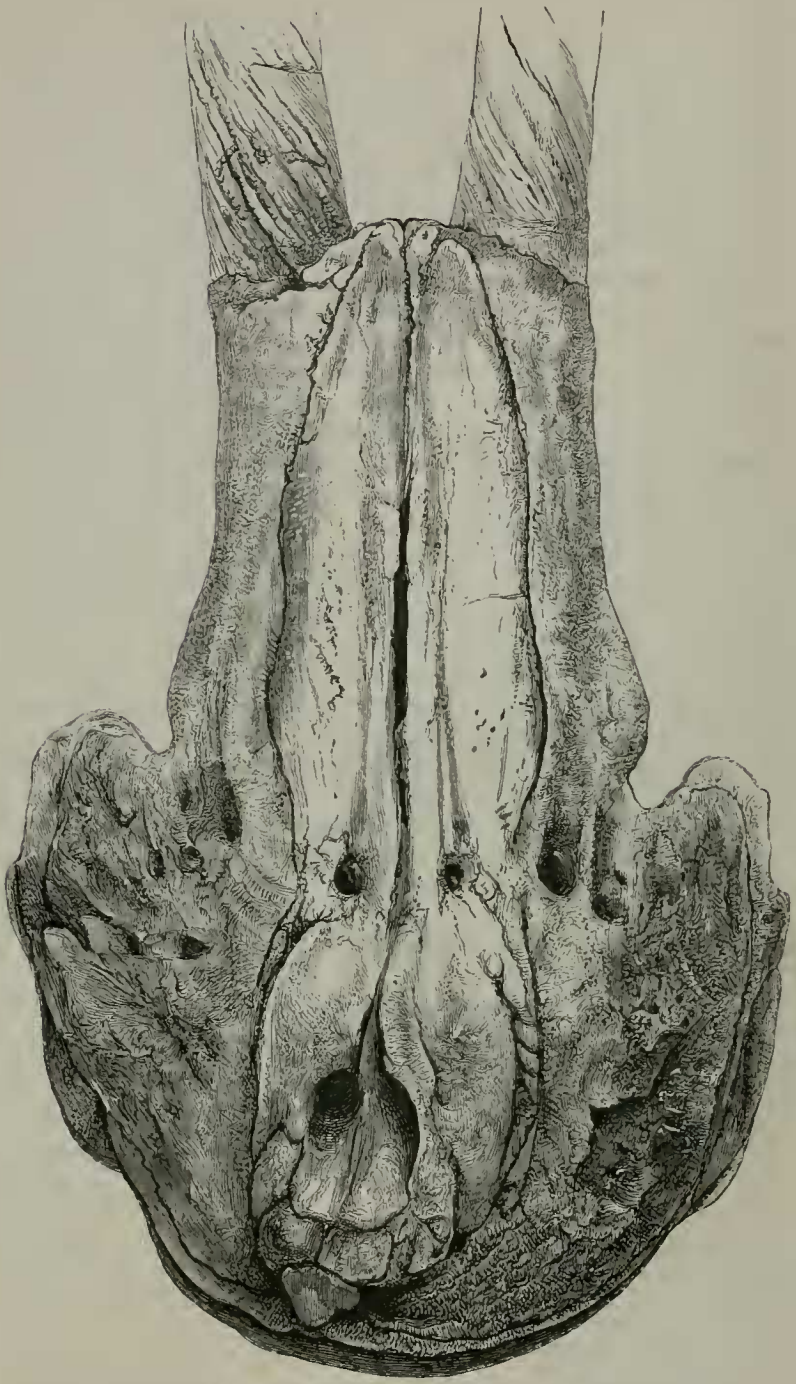
‡ Pallas visited London, according to Prof. Reinhardt, in 1761. The 'Zoographia' was published in 1811.

§ Arctic Regions, i. p. 490.

‖ Reinhardt, *l. c.*

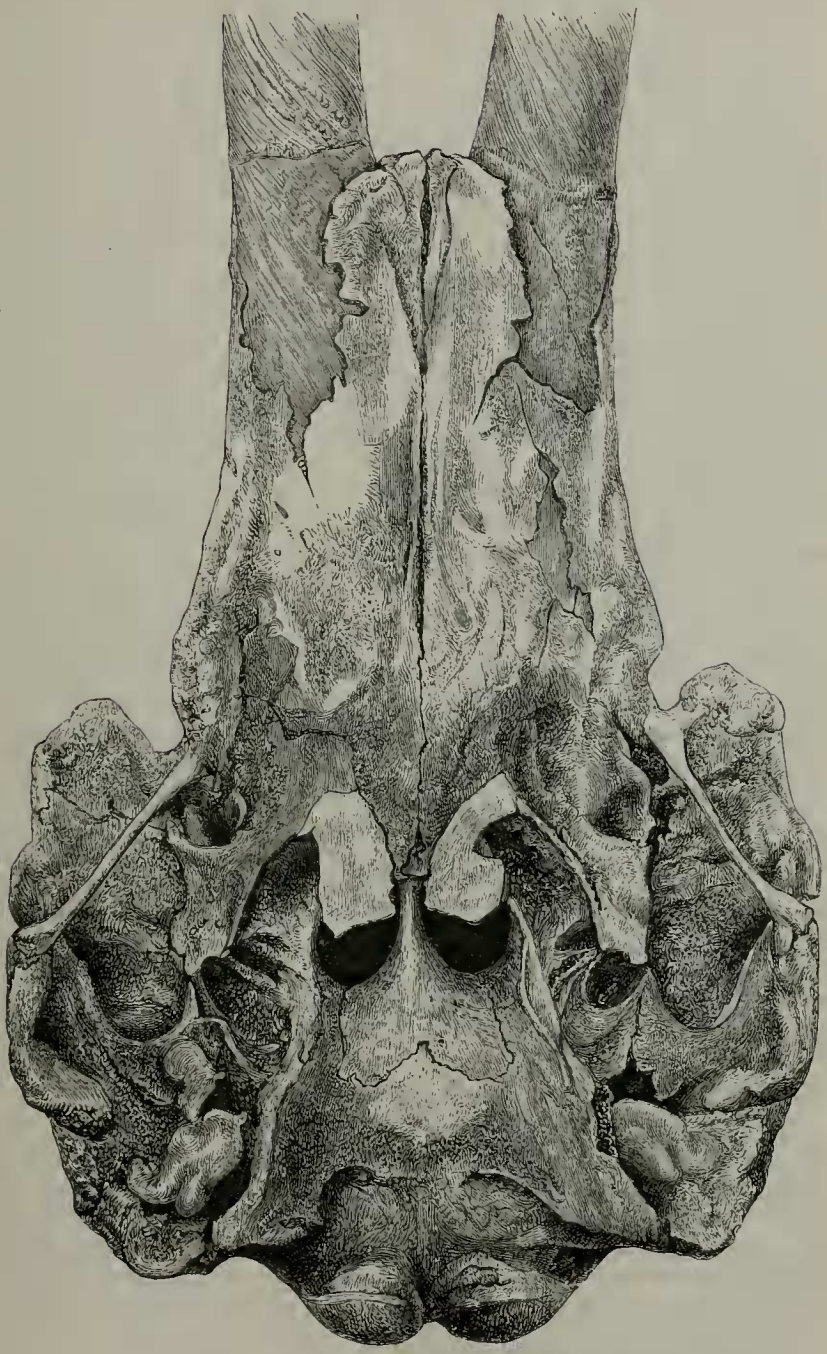
¶ Cat. Mus. Roy. Coll. Surg. (Osteology), ii. p. 185. The error was pointed out to me by Prof. Flower.

Fig. 1.



Superior surface of skull of *Monodon monoceros* with two tusks.

Fig. 2.



Inferior surface of skull of *Monodon monoceros* with two tusks.

tusk on the right side, yet there are passages in Scoresby * which point to other abnormalities in Narwhal skulls. He says, "All the male Narwhals that I have at different times seen killed, *excepting one*, had a tusk of 3′ to 6′ in length projecting from the left side of the head." Provokingly enough, he gives no further particulars. I should conjecture, by comparing this passage with what he says elsewhere, that he means that he once saw a male Narwhal with no tusks at all. Such a case would be paralleled by those of female Narwhals with developed tusks, three of which are on record. The first is mentioned by Anderson †, who says that the skull with two tusks brought to Hamburg in 1684 belonged to a female. The second is a very remarkable instance, and rests on the authority of Scoresby ‡. On his Greenland voyage he captured "a female Narwhal, with a tusk 4′ 3″ in length, of which 12″ were imbedded in the skull," on the left side, and with a *dextrorsal* spiral. On the right side was the usual undeveloped tusk, 9″ in length. The third is to be found in the Transactions of the Linnean Society for 1821 §. "A Hull whaler took a ♀ Narwhal with a tooth in the upper jaw, perfect, and in every respect like those of the males, though not so large. The sex of this animal was satisfactorily ascertained in cutting up, when two fœtuses were taken out of it."

The undeveloped tusk of the right side is usually about 9″ long, smooth, tapering, and found to be solid when a section of it is made. At the extremity there are sometimes a few markings, in a spiral or a circular direction. In adult specimens the pulp-cavity has closed up, and its place is marked by a very shallow depression on the outer edge of the maxillary. At the base there is always a rough, irregular growth, almost like the "burr" on a stag's horn. In a specimen in the Cambridge Museum, obtained by exchange from Hull in 1865, and in which the undeveloped tooth has never been removed from its socket, this growth forms a knob turned to the left. Scoresby notices this peculiarity, and observes that it is a distinguishing mark of female skulls—a statement that would appear to require further investigation. The examination of these abortive tusks, without knowledge of the animal to which they belonged, led naturalists such as Lacépède to believe in the existence of a smaller species, to which he gave the name of *Narwhalus andersonianus*, just as *Narwhalus microcephalus* was made from the examination of a tooth that was not full-grown.

When Narwhal tusks first came into the market, they were considered to belong to a marine variety of the Unicorn of Scripture; and much has been written to show that they fulfil all the required conditions. They were sold for very high prices, deposited in royal and ecclesiastical treasuries, and believed to be a specific against poisons and fevers. Dr. Olaf Worm of Copenhagen (better known by his Latin name Wormius), was the first who had the opportunity

* Scoresby, 'Arctic Regions,' i. p. 491.
† Anderson, 'Nachrichten von Grön'land.'
‡ Scoresby, 'Greenland,' p. 136.
§ Vol. xiii. p. 620. The statement is given on the authority of W. R. Whatton.

of observing the tooth *in situ*. He recognized the animal to which it belonged as a Cetacean, and gives a tolerably accurate description and figure*.

The existence of the second tooth was unsuspected till Solomon Reisel discovered it in a skull at Stuttgart. His paper "De unicornu marino duplici," dated Dec. 23, 1700, contains the first announcement of the fact, with a tolerable figure†. Cuvier, who appears to have known no more about the paper than its title, quotes‡ it as an authority for the existence of a bidental cranium in the Stuttgart Museum. This error is pointed out by Dr. G. Jäger in his paper. The next author who found out the fact was Tycho Tychonius at Copenhagen in 1706. His rare tract, "Monoceros piscis haud monoceros," is usually quoted as the place in which the fact is first stated§. Reisel considered that the second tooth was kept in reserve, as it were, to replace the fully-grown one in case it should be destroyed by an accident. Crantz knew that the second tooth existed, and held the same views as Reisel respecting it (Greenland, i. 105). Subsequently Sir E. Home went into the question once more, and published some good figures of male and female skulls with the tusks *in situ*, from specimens in the Hunterian collection‖.

The striation of the exserted tusk is always from right to left. I am not aware that this had ever been denied till Prof. Lilljeborg advanced his theory, though Lacépède speaks doubtfully on the subject (Cétacés, p. 146). Reinhardt remarks, "It seems to me that the spiral twisting of the tooth must evidently be considered as an effect of the same cause which produces the general asymmetry in the cranium of the Narwhal, as well as in those of all other Dolphins, the whole skull being twisted from the right towards the left side. That a tooth developed on the right side should be twisted to the left is, in my opinion, so far from being any thing unnatural, that it would, on the contrary, be quite incomprehensible if the tusk remained uninfluenced by that power which causes the whole skull to be twisted from right to left." He proceeds to argue that a proof of the correctness of this view is afforded by the bidental skulls, where the striation of the right tusk is the same as that of the left (figs. 1, 2). It is curious to remark that Owen's chief reason for rejecting a bidental skull in Brookes's Museum was the fact that the spiral lines on the right tusk corresponded with, instead of opposing, those on the left¶.

Reinhardt proceeds as follows:—"There is only one supposition that would make me feel inclined to believe that the tusk of a Narwhal could be twisted from the left to the right. We know that

* Museum Wormianum, 1655, p. 282 *et seq.*

† In Ephemerides Acad. Cæs. Leop. Nat. Cur. Dec. iii. Ann. vii. et viii. p. 350.

‡ Oss. Foss. v. p. 321.

§ Egede seems to have been aware of the existence of the second tooth. He probably learnt it during his residence in Greenland. His work was published in 1741. Comp. Egede's 'Greenland,' English transl. Lond. 1818, p. 77.

‖ Trans. Roy. Soc. 1813, p. 126.

¶ Odontography, p. 350. I can find no mention of this specimen in the sale Catalogue of Brookes's Museum.

there exist species of Flounders of which single individuals, contrary to the general rule, have their eyes on the left side of the head instead of on the right, or *vice versâ*. If any thing similar could occur in the Narwhal; if the cranium might be twisted to the right instead of to the left, then the tusk also would most likely be twisted in the same uncommon direction." By such a theory as this, he urges, Scoresby's remarkable instance of a female Narwhal tusk, with a dextrorsal spiral, may be explained.

There are now at least eleven bidental skulls in existence in different European museums, including the one at Cambridge. I have collected all the information I could about them, partly from personal observation, partly from the kindness of friends, and partly from books and figures.

1. Hamburg.—The celebrated specimen brought home in 1684 by Dietrich Petersen, Captain of the 'Golden Lion.' Female. It was originally deposited in the Museum of Herr Röding, a private collector of curiositics, but is now in the town museum, where I saw it in 1866. Unfortunately I had no opportunity of measuring it. The following dimensions are from Anderson*:—left tusk 7′ 5″ long, 9″ in girth; right 7′ long, and 8″ in girth. Figured originally by Anderson, whose engraver has made the right side the left, and *vice versâ*. His figure has been copied, with its errors, by Lacépède†, and very badly, but corrected, by Klein‡.

2. Copenhagen.—In the Zoological Museum of the University there is a complete adult skeleton with two fully developed tusks; a skull in a similar condition; and a skull with two very large tusks, but unfortunately much damaged. In the Museum of the Veterinary School is a fourth skull§.

3. Christiania.—A very fine skull, sent from Copenhagen. I took the following measurements in 1866:—

Total length, from extremity of occipital condyles to end of longest tusk	101″
Length of exserted portion of longest tusk	6′ 5″
Girth	8″

The other tusk is now 6½″ shorter, but has been broken. Apparently they were originally of the same length. It is 7″ in girth at the same point as the other. The tusks diverge 2″ at their origin, 8″ from the end of the broken tusk to the opposite point of the entire one.

4. Amsterdam.—The skull figured by Vrolik‖. He gives no history of it; but Reinhardt believes it to be one that was sold in 1846 by the Directors of the Copenhagen Museum. It will be remarked that the right tusk is the longest. Vrolik believes it to be of a female, but, as Reinhardt considers, on no very sufficient grounds.

* Nachrichten von Grönland.

† Histoire des Cétacés, pl. 9.

‡ Hist. Piscium, Add. ad Missus ii. iii. iv. plate iii.

§ These facts, which I noted in 1866, have been confirmed, and more accurately stated, in a letter kindly sent me by Prof. Reinhardt at the beginning of this year.

‖ Vrolik, *l. c.*

5. Weimar.—In Froriep's Museum. The left tusk is fully developed, the right projects only a few inches beyond the skull. Figured by Albers*. Its authenticity has been questioned by Dr. Jäger; and undoubtedly the fact of the right tooth being so small renders it very necessary to examine the skull most carefully.

6. Hull.—In the Museum of the Philosophical Society. Procured in 1838 from a whaler. It is of a young animal, the left tusk measuring 20″, the right ½″, exclusive of the portion within the skull†.

7. Paris.—A young skeleton recently sent from Copenhagen, where it had been preserved for some years in the Museum stores. The longest tusk projects 2½′, the shorter one only a few inches.

Besides these, three others have been mentioned.

1. A skull sent down from Greenland in salt, and exhibited at Amsterdam in the 17th century. This fact rests on the authority of Zorgdrager‡, who says the longest tusk measured 6′, the shorter, which was broken, 1′.

2. Leuckart§ saw a bidental skull at Vienna in 1841. The tusk on the right side was two-thirds shorter than that on the left. The spiral was sinistrorsal. This skull was certainly not there when I examined the collection in 1868. Possibly it was destroyed in the fire of 1848, which did great damage to the Museum.

3. Sowerby‖ mentions that a Narwhal came ashore at Friestone, in Boston Deeps, Feb. 15, 1800. He remarks, "it perfectly agreed with the name given by Linnæus, in having but one tooth, looking like a horn; but on examining the upper jaw, it was very evident that the other tooth had been lost; and we have since seen a perfect skeleton of the head of this animal with the two teeth fixed in their proper sockets." Unfortunately he gives no further particulars; so that one cannot judge whether his opinion was justified by the appearance of the skull, or rests merely on his own notions of symmetrical propriety.

It has been argued, by Rapp in the first instance, and by others since, that these bidental skulls are all forgeries. It might doubtless be possible to hollow out the right side of the skull in such a way as to admit of the insertion of a smaller tooth; and consequently those skulls where one tusk is much smaller than the other ought

* Icones ad Anatomen comparatam illustrandam. It has been shown by both Vrolik and Jäger that Albers was wrong in citing *nine* other cases of bidental skulls. One only of his is truly bidental, No. 5, the Hamburg specimen. Nos. 1, 2, 6, and 7 are probably other figures of it; No. 3 is the Stuttgart specimen described by Reisel; No. 4 is that at Copenhagen, described by Tychonius; Nos. 8 and 9 are those figured by Sir E. Home. His error arose from regarding the undeveloped tooth on the right side as something abnormal, and as a genuine second tusk.

† These particulars have been most obligingly communicated to me by Mr. R. Harrison, Curator of the Museum.

‡ Zorgdrager, p. 33.

§ F. S. Leuckart, 'Zoologische Bruchstücke,' Stuttgart, 1841, p. 48. I owe this reference to Vrolik, p. 22, *l. c.*

‖ Brit. Miscellany, Lond. 1806, p. 17, tab. ix.

to be submitted to the most rigorous examination. When, however, the two tusks are of the same, or of nearly the same size, as in my specimen (see figs. 1 and 2), I think deception is simply impossible; because any one can tell at a glance whether the right maxillary has increased in due proportion for the reception of a full-grown tooth *.

I find that Dr. R. Brown, in his account of the "Cetaceans of the Greenland Seas" (P. Z. S. 1868, p. 553), says, "double-horned ones (Narwhals) are not uncommon: I have seen them swimming about among the herd; and several such skulls have been preserved. Among others, there is a fine specimen, presented by Captain Graville, in the Trinity House, Hull. One of the teeth is 3′ long, and the other 4′." As I have never been in Greenland, and Dr. Brown has, it may seem presumptuous in me to doubt the accuracy of the first part of the above statement. But against Dr. Brown may be advanced the testimony of Scoresby †, who says, "Two or three instances have occurred of male Narwhals having been taken, which had two large external tusks. But this is a rare circumstance." The testimony of Crantz ‡ is to the same effect. Again, the great interest which was excited by the Hamburg specimen must surely have stimulated whalers to do their best to acquire so valuable a prize; and yet in 186 years only ten or eleven specimens have been obtained! Moreover I think we should always question the accuracy of any observation made from a ship's deck of animals that are swimming close together in a herd. It is so very easy to transfer the characteristics of one to another; nay, almost impossible to avoid doing so. For this reason I should be disposed to reject the instance cited by Sir E. Home §, who says, "A very intelligent captain in the Greenland fishery, who has gone thirty-five voyages, never saw a Narwhal with two tusks but once, and then from the masthead. The left appeared to be two-thirds longer than the right, and was above 5′ out of the water; the point of the right appearing just above the surface, so that the small one must have been about 3′." Surely it is most probable that the two tusks belonged to different animals. It is to observations of this kind that we owe the Dolphins with two dorsal fins, and other monstrosities of Cetacean literature.

On the other hand I was told by Mr. Wareham, the well-known dealer in china and curiosities, in whose shop I have had the opportunity of examining a great number of Narwhal tusks, bought by him out of the ship 'Diana,' of Hull, that the mate informed him that two of them were taken out of the same skull. I mention this fact, as it may indicate that whalers are indifferent to every consideration except that of getting as much ivory as possible, and do not stop to consider whether their prize has two tusks or one.

Dr. Brown has made a strange mistake with reference to the specimen from Hull, which he describes so particularly. Feeling anxious

* Professor Flower tells me that there is a bidental cranium in the Warwick Museum with the tusk on the right side inserted artificially.

† Arctic Regions, i. p. 490.

‡ History of Greenland, i. p. 105.

§ Lectures, i. p. 259.

to verify his measurements, I wrote to the Curator of the Hull Literary and Philosophical Society, who replies, in a letter dated Jan. 13, 1871, "I cannot imagine where Mr. Brown obtained his information. I have been to the Trinity House, have seen some of the leading men, and have looked over their Museum; and there is no such thing as the skull of a Narwhal about the place! They have two large horns, fixed one on each side of a door, with a silver plate, and the name of the donor engraved thereon; but that is all belonging to the Narwhal; and they are very much surprised at the statement I made. I made inquiry of some other people, but could not gain any information. I then went to a friend of the Gravilles; and he told me he had never heard of the skull with two tusks, which he thought he should have done had there been such a thing. He said he knew the widow had several tusks, which were sold some time ago, as he saw them before they were sold. Captain Graville, the elder, was frozen to death some years ago in the Arctic Seas; and the said horns were sold some time after his death by his widow. I asked if he thought it possible that the son had any thing of the sort; and he replied that he had not, as he had lived next door to him for some time, and was very intimate with him, and he was quite certain that if he had possessed such a thing he should have been made acquainted with it."

There are several interesting questions about the dentition of the young Narwhal, which is said to have molar and incisor teeth; but it will be necessary to procure fresh specimens before any certain conclusions can be arrived at respecting them.

2. Descriptions of seven new Species of Australian Land Shells. By James C. Cox, M.D., C.M.Z.S.

[Received December 2, 1870.]

(Plate III.)

1. Helix gratiosa, sp. nov. (Plate III. figs. 1, 1 *a*.)

Shell imperforate, rather thin, globosely turbinated, finely striated with lines of growth, and, under the lens, irregularly transversely striated; yellow-brown, ornamented with two rather broad dark chestnut bands, one beneath the suture, the other above the centre of the body-whorl, and a third round the umbilical region; spire conoid, apex smooth; whorls 7, rather convex, the last somewhat inflated, rounded at the base; suture distinctly margined below with a rather broad white line; aperture ovately lunate, diagonal, purplish within; peristome expanded and reflexed, slightly thickened and dark; margins joined by a thin dark callus; columella broadly expanded and completely occluding the umbilicus.

Diameter, greatest 1·28, least 1·12; height 1·30 of an inch.

Hab. Whitsunday Island, off Port Denison, Queensland.

A fine showy species combining the characters of *Helix macleayi* and *Helix blomfieldi*, and found, in company with the former, rather abundantly.

2. Helix coxeni, sp. nov. (Plate III. figs. 2, 2 *a*.)

Shell deeply, rather largely, and openly umbilicated, depressedly globose, very thin, translucent, light yellow-brown, irregularly striated with slightly raised waved striæ, irregularly studded with numerous sharp, rather long, fine recurved bristles; whorls $5\frac{1}{2}$, last rapidly increasing in size, a little descending in front, and considerably inflated; aperture broadly oval, anterior margin scarcely everted, posterior broadly everted; columella much dilated, slightly covering the umbilicus, and produced beyond it; margins joined by a thin callus.

Diameter, greatest 0·97, least 0·70; height 0·63 of an inch.

Hab. Whitsunday Island, off Port Denison, Queensland.

I have named this species after Mr. Coxen of Brisbane, an ardent and enthusiastic collector of our Australian shells.

3. Vitrina superba, sp. nov.

Shell depressed, orbicularly auriform, light olive-green, rather opaque, shining; whorls 3, convex, rapidly increasing, last much expanded; spire scarcely raised, rounded, striated with lines of growth; aperture oblique, lunar-ovate, largely open; peristome simple, thin; columella sharply arched; margins widely separated.

Diameter, greatest 1·20, least 0·74; height 0·59 of an inch.

Hab. Mount Dryander, Port Denison, Queensland.

This fine species is, so far, the largest known. According to Reeve's figure it must closely resemble *Vitrina magnifica*, but is larger and more depressed.

4. Helix bellengerensis, sp. nov.

Shell deeply, rather narrowly umbilicated, turbinately depressed, lenticular, thin, dark claret-brown, not shining; whorls $5\frac{1}{2}$, coarsely obliquely striated, very gradually increasing in size, last whorl rather sharply keeled at the periphery and depressed in front; base convex; aperture rotundately lunar; last whorl suddenly contracted behind an everted peristome, which is white and slightly thickened; margins approaching; anterior margin inserted below the carina; columellar margin only slightly dilated.

Hab. Bellenger River, east coast of New South Wales.

Diameter, greatest 0·55, least 0·48; height 0·35 of an inch.

A simply lenticular species allied to *H. leucocheilus*, Cox, from which it differs in being more conical and more sharply keeled.

5. Helix sarda-labiata, sp. nov. (Plate III. figs. 3, 3 *a*.)

Shell deeply, openly, rather largely umbilicated, orbicularly conoid, thin, smooth, very finely striated throughout, pale fawn-grey; whorls 6, gradually increasing in size, the last sharply deflected in front; aperture oval, margins closely approximating, slightly thick-

1

2

2a

1a

3

3a

5

4

4a

5a

G.B.S. Sowerby lith

M & N Hanhart imp.

NEW AUSTRALIAN LAND SHELLS

ened and reflexed, and of a polished pink carnelian appearance within; columellar margin triangularly dilated, overhanging the umbilicus.

Diameter, greatest 1·10, least 0·83; height 0·80 of an inch.

Hab. Mount Dryander, Port Denison, Queensland.

6. Helix o'connellensis, sp. nov. (Plate III. figs. 4, 4 *a*.)

Shell with a wide, open, funnel-shaped umbilicus, semiglobose, smooth, base flat and much excavated round the umbilicus, blackish chestnut, rather solid; spire obtuse; whorls 6; suture margined with a rather broad white line; aperture oval, lilac within, darker at the lip, which is expanded throughout; margins approaching, columellar margin broadly expanded and overhanging the funnel-shaped umbilicus.

Hab. The O'Connell River, Port Denison, Queensland.

Diameter, greatest 1·15, least 0·87; height 0·85 of an inch.

Closely allied to and resembling *H. rainbirdi*, Cox, in the excavated base around the umbilicus; but it is a smaller species, and easily distinguished from *H. rainbirdi* by its white-margined suture.

7. Helix whartoni, sp. nov. (Plate III. figs. 5, 5 *a*.)

Shell deeply, openly umbilicated, depressedly globose, thin, finely striated, profusely banded with yellow and light-chestnut bands varying in width and slightly undulating; spire slightly raised; whorls $6\frac{1}{2}$, rather flat, last whorl descending in front; aperture lunar-oval, margins approaching, joined by a thin callus; lip slightly thickened and everted; columellar margin triangularly dilated, half concealing the umbilicus; aperture pearly within.

Diameter, greatest 1·53, least 1·15; height 1·10 of an inch.

Hab. Port Denison, Queensland.

This is a very constant species, and in great abundance, showing but little variation. It is allied to *H. appendiculata*, Reeve, but is a thinner and lighter shell and more depressed.

DESCRIPTION OF PLATE III.

Figs. 1, 1 *a*. *Helix gratiosa*, p. 53.
2, 2 *a*. —— *coxeni*, p. 54.
3, 3 *a*. —— *sarda-labiata*, p. 54.
4, 4 *a*. —— *o'connellensis*, p. 55.
5, 5 *a*. —— *whartoni*, p. 55.

3. On some New or Rare Birds' Eggs.

By Alfred Newton, M.A., F.R.S., V.P.Z.S.

[Received January 17, 1871.]

(Plate IV.)

In continuation of the notes which I have before (P. Z. S. 1861, p. 393, and 1867, p. 161) presented to the Society, I have for a

third time the honour of offering to it some remarks on new or rare birds' eggs, which the kindness of several scientific friends has placed it in my power to make. In the present case these friends are (as on a former occasion) the authorities of the Smithsonian Institution (Professors Henry and Baird), Mr. E. L. Layard, and Dr. Cunningham.

1. Leucosticte griseinucha.

This, received from the Smithsonian Institution, is a perfectly white egg, measuring ·97 in. × ·67 in. I am not aware that the egg of any species of this genus has been before described.

2. Theristicus melanopis. (Plate IV. fig. 8.)

I have already described this specimen in the 'Ibis' (1870, p. 502), and it is unnecessary for me now to say more about it than that I owe it to Dr. Cunningham.

3. Calidris arenaria. (Plate IV. fig. 2.)

Mr. Gould has lately shown (B. Gr. Brit. part xi.) that hitherto nothing has been known with certainty about the breeding of this bird, one of the commonest winter visitants to the temperate regions of both New and Old Worlds. The egg has several times been announced as having been obtained; but the specimens so recorded differ materially from that which I now exhibit, as that also does from those figured by Thienemann (Fortpflanz. gesammt. Vög. t. lxii. fig. 2) and Bädeker (Eier europ. Vög. t. lxxi. fig. 5), so that I can hardly doubt that the egg now on the table is the first genuine Sanderling's which has been seen in Europe.

It was sent to me by the Smithsonian Institution; and the ticket accompanying it shows that it was procured by Mr. M'Farlane on the Barren Grounds of America, near the Anderson River; and the fact that the parent bird (♀) was shot leaves no room for doubt as to its authenticity and proper identification. It measures 1·43 in. × ·98 in. The nest was said to have been of hay and decayed leaves.

4. Macrorhamphus griseus.

This egg, not hitherto described, is also from the Smithsonian Institution. It resembles in general marking and colour that of a Redshank (*Totanus calidris*); but the specimen is unfortunately so much broken that I cannot give its dimensions, or propose that it should be figured in the Society's 'Proceedings.'

5. Numenius borealis. (Plate IV. fig. 1.)

Another of the generous gifts of the Smithsonian Institution, and interesting as the egg of a scarce straggler to the Old World. It shows in its appearance a connexion between the genera *Numenius* and *Limosa* (*L. lapponica*), and measures 2·04 in. × 1·43 in. It was obtained by Mr. M'Farlane from an Esquimaux on the Arctic coast of America, east of the Anderson River.

6. Numenius hudsonicus. (Plate IV. fig. 3.)

This egg has more of the normal appearance of *Numenius*. It measures 2·38 in. × 1·47 in., and was obtained by Mr. M'Farlane from an Esquimaux at Anderson Lower Fort.

7. Actodromas bairdi.

The egg of this lately distinguished species, which in its wanderings is not confined to the Old World (*cf.* Ibis. 1870, p. 151), is unfortunately broken, and I cannot give its dimensions. Enough, however, is left to show the style of colouring—pale yellowish-white ground with markings of brownish red and dull reddish violet. It was procured by Mr. M'Farlane, and the parent shot near the nest.

8. Chionis minor. (Plate IV. fig. 7.)

This was sent to me by Mr. Layard, who received it from the Crozette Islands. No egg of either species of the genus has been before known; and this confirms, by its appearance, the systematic position of the form shown by osteology, its affinity, namely, to the Plovers. It measures 2·23 in. × 1·48 in.

9. Xema sabinii. (Plate IV. fig. 5.)

In 1861 I had the pleasure of showing a much damaged specimen of this egg, obtained in Siberia by Dr. von Middendorff. The present, received with two others from the Smithsonian Institution, possesses precisely the same general characters. They measure respectively 1·78 × 1·23, 1·72 × 1·26, and 1·74 × 1·24, and were procured by Mr. M'Farlane at Franklin Bay, on the Arctic coast of America, east of the Anderson River. The hen bird was shot.

10. Chroicocephalus philadelphia. (Plate IV. fig. 6.)

Though this egg has before been received in this country from the Smithsonian Institution, it has never been figured or described; and this is the first I have possessed. It is very normal in appearance, and measures 1·8 in. × 1·29 in. It was also obtained by Mr. M'Farlane at Anderson-River Fort.

11. Larus franklini. (Plate IV. fig. 4.)

I am not aware that the egg of this bird has been hitherto known. It is also normal in character, and measures 2·13 in. × 1·43 in. It was transmitted from Manitoba to the Smithsonian Institution by Mr. L. D. Gunn.

12. Clangula albeola.

This is one of a nest of nine eggs sent to the Smithsonian Institution by Mr. M'Dougal, who procured it on the Youkon. It measures 1·63 in. × 1·23 in., and is of a yellowish-white colour, and smooth in grain, like a Teal's.

13. Somateria v-nigrum.

One of eight eggs taken near St. Michael's, Norton Sound. It is smooth and of a pale olive-green, measuring 2·4 in. × 1·67 in.

14. Chen hyperboreus.

From the Arctic coast, eastward of the Anderson River. It is of a warm yellowish-white, but much obscured by dirt, and measures 2·93 in. × 2·09 in.

EXPLANATION OF PLATE IV.

Fig. 1. Egg of *Numenius borealis*, p. 56.
2. „ *Calidris arenaria*, p. 56.
3. „ *Numenius hudsonicus*, p. 57.
4. „ *Larus franklini*, p. 57.
5. „ *Xema sabinii*, p. 57.
6. „ *Chroicocephalus philadelphia*, p. 57.
7. „ *Chionis minor*, p. 57.
8. „ *Thcristicus melanopis*, p. 56.

4. On *Hemicentetes*, a new Genus of Insectivora, with some Additional Remarks on the Osteology of that Order. By St. George Mivart, F.R.S.

[Received January 17, 1871.]

(Plate V.)

Hemicentetes madagascariensis.

Erinaceus madagascariensis, Shaw, Gen. Gool. i. 2. p. 458.
Erinaceus ecaudatus, Schreber, iii. p. 584, tab. 165*.
Erinaceus semispinosus, Cuvier, Règ. An. 1st edition, p. 136.
Setiger variegatus, Geoff. St.-Hilaire, Nouv. Dict. xxxii. p. 54.
Centenes semispinosus, Cuvier, Règne Anim. i. p. 125; Desmarest, Mamm. p. 162. no. 253.
Centetes semispinosus, Fischer's Synopsis, p. 245. no. 3; Isid. Geoff. St.-Hilaire, Dict. Class. xvi. p. 41, and Magasin de Zoologie, 1839, pp. 15 and 32; Wagner, J. A. Schreb. Supplem. ii. pp. 35 and 553, and v. p. 583.
Centetes madagascariensis, Gray, Mag. Nat. Hist. 1836, and List of Mammalia in Brit. Mus. 1843, p. 82.
Le jeune Tanrec, Buffon, Hist. Nat. Suppl. iii. p. 214, tab. xxxvii.; Sonnerat, Voyage à la Chine, tom. ii. p. 146.
Asiatic Hedgehog, Pennant's Quadrupeds, ii. p. 236.

The curious insectivore the osteology of which is now, I believe, for the first time described, has been very long known, having been well figured by Buffon in 1776. Nevertheless it was considered by M. Isidore Geoffroy St.-Hilaire a species determined from imma-

J Smit. lith

M & N Hanhart. imp

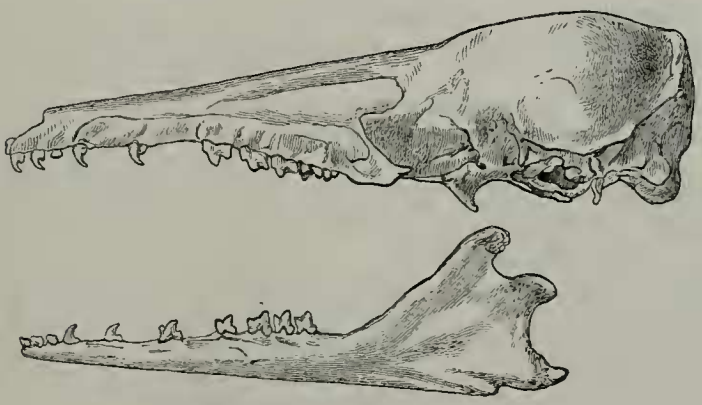
NEW OR RARE BIRDS EGGS.

ture specimens only *. Recently both our National Collection and the Museum of the Royal College of Surgeons have been enriched by skeletons of this species, and a very perfect and fully adult specimen in the possession of Mr. E. Gerrard has been very kindly lent me for description and to supply the figures herewith given.

These specimens have convinced me that the differences between the species now described and *Centetes ecaudatus* are of sufficient inportance to warrant the elevation of the former into a distinct genus.

The external characters are so well known already that I shall confine myself to a description of the skeleton and dentition, pointing out the resemblances and differences between these parts in *Hemicentetes* and in *Centetes*†.

Fig. 1.



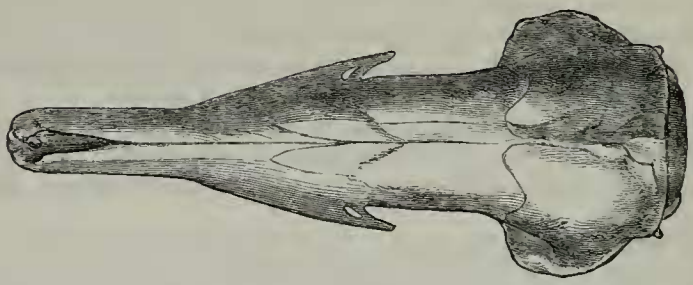
Side view of skull, twice the natural size.

The skull is even more produced than is that of *Centetes*, but it is more tapering, more so, indeed, than in any insectivore, even *Talpa*. Thus, when looked at from above, it is much less cylindrical than in *Centetes*; and even when viewed laterally, it is at least as conical from behind forwards, in spite of the absence of the sagittal ridge which is so strongly marked in *Centetes*. The skull is broadest between the glenoidal surfaces, and then tapers forwards with considerable regularity. The orbits are not only incomplete behind, but there is not even any trace of a postfrontal process. Posteriorly the skull is rounded; but anteriorly the nares slope gently backwards, with a very elongated opening. There is no zygomatic arch, but the maxillary process projects more backwards and less outwards than in *Centetes*; it ends in a sharp, rather upwardly inclined point.

* He says, in 'Magasin de Zoologie,' 1839, p. 16, "il sera de toute évidence qu'elle n'a été établie que sur de jeunes sujets," and at p. 32, "On ne connaît que les caractères du jeune âge."

† For a description of the skeleton and dentition of *Centetes ecaudatus*, see the 'Cambridge Journal of Anatomy,' vol. i. (1867) p. 298, and vol. ii. (1868) pp. 138, 139, and 148.

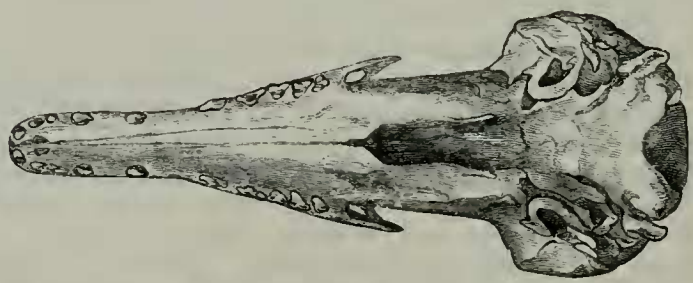
Fig. 2.



Upper view of skull, twice the size of nature.

There is no ridge or other process at the front of the orbit. As has been said, there is no sagittal crest, but a tolerably developed lambdoidal one which extends across from one glenoid surface to the other. The temporal fossa is much smaller than in *Centetes*; and the concavity which exists in the last-named genus, above and in front of the first upper premolar, is wanting in *Hemicentetes*. There is no marked concavity above the anterior opening of the infra-orbital canal, or in the summit of the cranium between the orbits. The palate is very long and narrow, but of less equal width than in *Centetes*, expanding laterally to a greater degree from before backwards. Its posterior margin is not at all or only very slightly thickened (without any transverse bony plate behind such thickening when present), and with a deep, sharp median notch. The palate projects backwards considerably beyond the last molar; it is but very slightly concave antero-posteriorly, and has no median ridge running in that direction, nor any defects of ossification.

Fig. 3.



Base of skull, twice the size of nature.

Pterygoid fossæ cannot be said to exist, the ecto-pterygoid ridge not developing into a descending plate of bone, although distinctly perforated posteriorly. The pterygoid descends as a triangular lamella of bone ending in a delicate backwardly, downwardly, and outwardly directed hamular process. The meso-pterygoid fossa slightly narrows as it proceeds backwards, but does not end pos-

teriorly (as in *Centetes*) in any hemispherical excavation between the basisphenoidal processes, which bend outwards to contribute to form the auditory bullæ. There is no conspicuous foramen in the place of that one which in *Centetes* is situated in the roof of the hemispherical basisphenoidal excavation. Instead of that one foramen there are two minute ones towards the anterior end of the inferior surface of the basisphenoid. The pterygoid region is much more bullate than in *Centetes*.

The foramen magnum is very large relatively, and looks almost directly backwards. On each side of it is a well-developed paroccipital process, anterior to which, but separated from it by an interspace, is a small process of the squamosal; so that there are two processes on each side as in *Centetes*, only that the mastoid (placed between them) contributes to neither, instead of to both of those processes as in the last named genus.

The small glenoid surface is bounded internally by a much smaller entoglenoid process than in *Centetes*. The tympanic bone is a mere ring.

The præmaxilla is very small, and does not nearly meet the anterior prolongation of the frontal as it does in *Centetes*. The nasals are distinctly separate for more than their anterior half, but they appear to anchylose together for their hindmost third. They extend backwards on the dorsum of the skull, about as far backwards as do the maxillæ. As in *Centetes* so in *Hemicentetes*, the parietals form more, and the frontals less of the roof of the cranium than in *Erinaceus*. The zygoma is wanting, only a small process extending backwards and outwards behind as well as above the last molar. As before said, the mastoid appears on the outer surface of the skull, where it is subtriangular, with the apex upwards, and not bifurcating inferiorly, as in *Centetes*.

The mandible has its ascending ramus only very slightly concave externally, its posterior margin between the condyle and the angle relatively much longer and more concave than in *Centetes*. On the other hand, the coronoid process is rather less raised relatively above the condyle. The inner surface of the ascending ramus above the dental foramen is much less concave. The horizontal ramus is not constricted behind the last molar. The condyle is rather elongated antero-posteriorly, and the distance from it to the coronoid process is not quite so great as from it to the mandibular angle. The last-mentioned part is flattened from above downwards, but so that it presents a slight horizontal projection, not only on the inside, but also on the outside of the vertical ramus.

There is a small, rather pointed than obtuse, prominence on the inferior margin of the mandible, a little distance in front of the angle. This is sharper than in *Centetes*.

There is a good-sized precondyloid foramen on each side, and in front of it a jugular foramen; but I have not observed a definite carotid foramen. There is a venous foramen in the posterior part of the squamosal, near its upper border, and a minute opening behind the glenoid surface. The foramen ovale appears to be

formed entirely by the alisphenoid. The optic and sphenoidal opening is hidden by an alisphenoidal lamella. There is no long bony canal for the optic nerve to traverse, as in *Erinaceus*, nor is there any suboptic foramen, nor any conspicuous orbital one. There is an alisphenoid canal, with its posterior aperture situated just in front of the foramen ovale, but it is much less conspicuous than in *Centetes*. There is no external alisphenoid canal. There is a distinct posterior palatine foramen on each side. The spheno-palatine foramen is hidden, unless it appears as a minute opening in the lower part of the large infraorbital canal. The anterior palatine foramen on each side is relatively rather large. The infraorbital foramen is exceedingly large, very much larger relatively than in *Centetes*, bounded above by a very delicate spiculum of bone. The lachrymal foramen opens immediately behind the summit of that delicate spiculum.

There are two small foramina on the outer side of the very slender horizontal ramus of the mandible; the more anterior beneath the first premolar, the more posterior beneath the first molar.

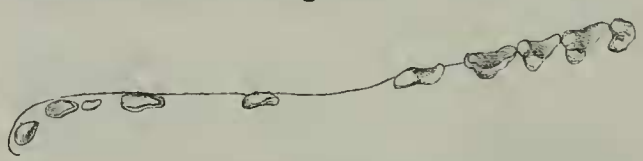
The dental formula is:—

$$\text{I.}\ \tfrac{3-3}{3-3},\ \text{C.}\ \tfrac{1-1}{1-1},\ \text{P.M.}\ \tfrac{3-3}{3-3},\ \text{M.}\ \tfrac{3-3}{3-3} = \tfrac{20}{20} = 40.$$

The upper incisors on each side are all separate from each other and from the canine; and the first upper incisor is also separated by an interval from its fellow of the opposite side.

The first two incisors on each side are of nearly the same size and shape. Each is conical, pointed, and much hooked, with a very large posterior lobe.

Fig. 4.



Teeth of upper jaw, four times the size of nature.

The third incisor is much shorter, gradually broadening downwards from the socket to the distal edge.

The canine is shaped like the first two incisors, but rather larger, and with the posterior lobe relatively smaller. It is very much smaller, relatively as well as absolutely, than in *Centetes*.

The first premolar, in shape and size, is very much like the canine, though separated from the latter by an interspace, which is about three times as long as that which divides the canine from the third incisor.

The second premolar is shaped like the first premolar of *Centetes*. It is separated from the first premolar by an interval still greater than that which divides the first premolar from the canine.

It has a posterior talon, but no internal cusp. Compared with the

premolar in front of it, it is much antero-posteriorly extended, *i. e.* less canine-like.

The third premolar is nearly contiguous to the second; it is much simpler than is the homologous tooth in *Centetes*. The principal cusp predominates less over the talon; and sometimes there is a minute cusp in front of the principal one. The tooth is as it were formed entirely of the cingulum, there seeming to be nothing answering to the normal principal cusps, still less to any internal cingulum. Nevertheless it is probable that the actual principal cusp is really made up of the normal external cusps, plus the cingulum, fused together.

The first and second upper molars are similar to the last premolar, except that the part answering to the normal cusps is more developed, and extending inwards, most so in the more posterior tooth, and showing that the principal cusp of the third premolar is (as before stated) probably of similar nature. The external cingulum develops two low subequal cusps. There is no internal cingulum.

The third and last upper molar is less in antero-posterior and very much less in vertical extent than is the tooth in front of it. Also the cingulum bears a smaller proportion to the rest of the tooth, which thus comes to consist of two subequal parts, one exterior, the other internal. All the molars are contiguous to each other and to the third premolar.

In the lower jaw the six incisors are much closer together than are those of the upper jaw. This is less due to their implantation than to the lateral expansion of their crowns. They are less vertinally extended than are the upper ones, and each expands upwards from the root to the cutting-edge.

Fig. 5.

Teeth of lower jaw, four times the size of nature.

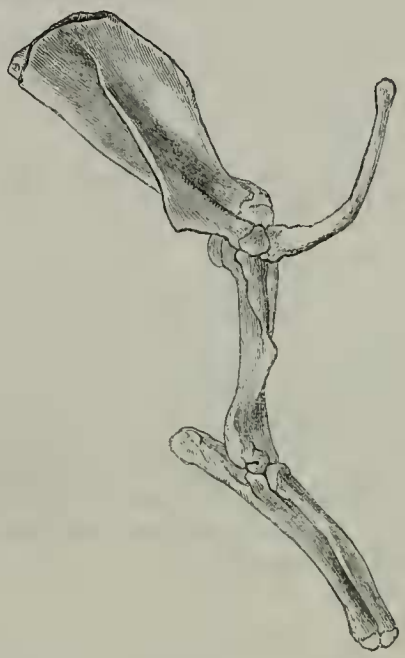
The canine is very much smaller, relatively as well as absolutely, than in *Centetes*. It is not received into any fossa in the upper jaw. It is a much curved conical tooth, with a considerable posterior cusp at its base. The first premolar, in size and shape, is quite like the canine in front of it. It is separated from the latter by a considerable interval.

The second premolar is quite like the first lower premolar of *Centetes*. In consists of three unequal cusps, without any internal production. The middle cusp is much the largest, and curved and pointed like the principal cusp of the first premolar.

The third premolar projects inwardly hardly, if at all, more than

the second; and it resembles the latter tooth in size and shape, except that the anterior of the three cusps is larger. The three true molars are very similar in size and shape to the third premolar, except that a cusp projects internally from the inner side of the posterior part of each. They resemble the homologous teeth of *Centetes*, squeezed together (as it were) from within outwards, while the posterior prism of each nearly aborts—thus approximating to *Chrysochloris*.

Fig. 6.



Scapula, clavicle, humerus, radius, and ulna; once and a half the size of nature.

Fig. 7.

Carpus, twice the size of nature.

Fig. 8.

Vertebræ, once and a half the size of nature.

The skeleton of *Hemicentetes* closely resembles that of *Centetes*, except that the neural spines, especially the cervical ones, are relatively, as well as absolutely, less developed, and that the dorso-lumbar vertebræ are twenty, or at most twenty-one, in number, instead of twenty-three or twenty-four as in *Centetes*. The pubic

Fig. 9.

Pelvis, once and a half the size of nature.

symphysis is also widely open in some individuals (probably females); and the humerus is not quite so long as the scapula. Moreover the os scaphoides is distinct from the os lunare; and there is no os intermedium.

Since the publication of my paper on the osteology of the Insectivora* additional material has come to hand. Thus skeletons not only of *Hemicentetes* (formerly known as *Centetes madagascariensis*), but also new ones of *Rhynchocyon* and *Petrodromus*, have been added to the British Museum and the collection of the Royal College of Surgeons. At the last-named institution there has also been received a perfect skeleton of *Ericulus*, which is here figured by the kind permission of the Council and Curator.

Rhynchocyon.—As to this genus I am now able to add that the occipital foramen looks mainly backward, that the pterygoid fossa does not nearly extend so far forward as the hinder margin of the palate, that there is no paroccipital process, and that there is a very small mastoid process just behind the external auditory meatus, but a more marked projection at the lower end of the mastoid where it runs down behind the auditory bulla at the posterior end of the harmonia joining the tympanic to the petrosal.

I may also add that, in a skull in the British Museum, I find there are two minute teeth in the place of the first upper premolar. As

* See 'Cambridge Journal of Anatomy,' vol. i. (1867) p. 281, and vol. ii. (1869) p. 117.

the specimen is fully adult and the teeth even more worn than in the skull with the normal dentition, these small teeth can hardly belong to the milk-dentition.

Petrodromus.—In a new specimen, in which the last molars and the upper and lower anterior incisors are not in place, I have observed the following characters:—

There is no sagittal crest; the petro-mastoid, which is a single bone, is separate from the squamosal, which sends down a considerable entoglenoid process.

The anterior part of the auditory bulla is formed by the alisphenoid. The petrosal has a large cerebellar fossa.

A spatulate process extends backward from the middle of the hinder margin of the palate.

A small foramen perforates a process of the parietal, which descends between the alisphenoid and squamosal.

The rhinencephalic chamber is extensive. The second upper incisor has a small cusp at its base behind; and the lower incisors are bilobed *.

In this specimen there are but six lumbar vertebræ, and the internal condyle of the humerus is perforated.

Ericulus.—There is now a complete skeleton of this form in the Museum of the Royal College of Surgeons; and a plate representing it is here given by the kind permission of the authorities of that institution. It has 16 dorsal, 7 lumbar, 22 sacral, and about 12 caudal vertebræ. The spinous process of the axis is large, but the other cervical spines are quite rudimentary. The cervical transverse processes are not much antero-posteriorly expanded. The dorsal spines are but slightly elongated; but those of the lumbar vertebræ are very much enlarged and antero-posteriorly extended. The lumbar metapophyses, anapophyses, and transverse processes are small; but the lumbar spines have tolerably marked hyperapophyses. There are no hypapophysial processes. The manubrium is of moderate size and not keeled. The clavicles are elongated and slender.

Thus the genera of the order Insectivora yet known amount to 24 in number.

INSECTIVORA.

Family I. GALEOPITHECIDÆ: Galeopitheeus.
,, II. MACROSCELIDIDÆ: Macroscelides, Petrodromus, Rhynchocyon.
,, III. TUPAIIDÆ: Tupaia, Ptilocercus, Hylomys.
,, IV. ERINACEIDÆ: Gymnura, Erinaceus.
,, V. CENTETIDÆ: Centetes, Hemicentetes, Ericulus, Echinops, Solenodon.
,, VI. POTAMOGALIDÆ: Potamogale.
,, VII. CHRYSOCHLORIDÆ: Chrysochloris, Chalcochloris.
,, VIII. TALPIDÆ.
Subfamily I. *Talpina*: Scalops, Scapanus, Condylura, Talpa.
,, II. *Myogalina*: Urotrichus, Myogale.
,, IX SORICIDÆ: Sorex.

* As observed by Dr. Peters in his 'Reise nach Mossambique,' i. Säugethiere, p. 95, tab. xxii. fig. 9.

With the corrections and additions* possible at this date the osteological characters of these groups may be stated as follows:—

Galeopithecidæ.

Galeopithecus, Pallas†

Dentition: I. $\frac{2-2}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{2-2}{2-2}$, M. $\frac{3-3}{3-3}$=34. Cranium broad, depressed; muzzle obtuse; skull broadest between posterior roots of zygomata, which are complete and strong, but short; well-developed postorbital processes, sometimes enclosing orbits; margin of orbit sharp, with a small process in front; orbit large, temporal fossa rather small; a tympanic bulla; no alisphenoid canal; concave posterior margin of palate far forwards; pterygoid fossa minute; no basisphenoidal or paroccipital processes; large swollen mastoid process on each side; strong postglenoid process, tending much forwards; optic foramen large; foramen rotundum and sphenoidal fissure represented by one opening; a supraorbital, but no suboptic foramen; several small suborbital foramina on each side; anterior palatine foramina very large; lachrymal foramen small, opening within the orbit; upper canine and second incisor each with two roots; lower incisors pectinated; upper and lower molars very complex. Thirteen or fourteen dorsal, five or six lunar, five or six sacral, and many caudal vertebræ; ribs very broad; clavicles long, a scapholunar bone, but no os intermedium; ulna anchylosed to radius; fibula complete, but smallest towards its upper end; metatarsals shorter than digits; five digits to each extremity; a large cæcum.

Hab. South-eastern Asia and Indian archipelago.

Macroscelididæ.

Dentition: I. $\frac{---}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{3-3}{3-3}$. Skull broadest between posterior roots of zygomata, which are complete and rather deep; orbits not encircled by bone; generally no postorbital processes; dorsum of muzzle concave transversely; palate sometimes decidedly extending backwards beyond last molar; orbit large, temporal fossa very small; a tympanic bulla; no paroccipital process; no alisphenoid canal, malar imperforate; carotid, postglenoid, and suboptic foramina; one opening representing both sphenoidal fissure and foramen rotundum; foramen ovale large; lachrymal foramen opening well within the orbit; coronoid process of mandible not rising much, if at all, above condyle; canine close to premaxillary suture; last upper premolars not more vertically extended than the true molars; upper molars quadricuspid, the anterior and posterior cusps being connected by transverse ridges. Thirteen dorsal and six or eight lumbar vertebræ, lumbar transverse processes much extended antero-

* Prof. Flower, in his 'Introduction to the Osteology of the Mammalia,' p. 149, has noticed the conditions of the tympanic in the different groups.

† Pallas, Act. Petrop. iv. 1. p. 208, tab. viii.; De Blainville, 'Ostéographie: Lemur,' pls. vi., viii., ix.; Waterhouse, Trans. Zool. Soc. ii. p. 335, pl. lviii.; Wagner, Schreb. Supplem. i. p. 318, v. p. 522.

posteriorly; no hyperapophyses; hypapophyses beneath lumbar vertebræ; scapula with a long metacromion; clavicles slender; internal condyle of humerus perforated; scaphoid and semilunar separate; pelvic symphysis elongated; metatarsus as long as, or longer than, digits, and much longer than tarsus; sometimes only four digits; a cæcum.

Hab. Africa.

Macroscelides*, Smith.

Dentition: I. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$ or $\frac{3-3}{4-4}$. Skull sometimes much inflated by air-cavities, always much contracted between orbits; no postorbital process; large defects of ossification in the palate; pterygoid fossa extending forwards to posterior margin of palate; suboptic foramen not conspicuous; infraorbital canal very short, the lachrymal foramen opening immediately above posterior termination of infraorbital canal; angle of mandible elongated; upper incisors and canines all of much the same size; third incisor with a single root; third lower molar but little smaller than the first or second. Six or seven lumbar vertebræ; cervical spines very rudimentary; ulna anchylosed to radius; five digits to each extremity.

Hab. Africa, including the the northern part.

Petrodromus†, Peters.

Dentition: I. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$. A strongly marked sagittal ridge; skull never much inflated; no postorbital process; large defects of ossification in the palate; pterygoid fossa extending forwards to the posterior margin of palate; suboptic foramen conspicuous; infraorbital canal short; angle of mandible elongated; first upper incisor very much larger than the second; third incisor with two roots; third lower molar but little smaller than the first or second; six or seven lumbar vertebræ; cervical spinous processes very small; ulna anchylosed to radius; five digits to the manus, four to the pes.

Hab. Eastern Africa.

Rhynchocyon‡, Peters.

Dentition: I. $\frac{1-1}{3-3}$ or $\frac{0-0}{3-3}$, M. $\frac{3-3}{3-3}$. A strongly marked sagittal ridge; skull never inflated; cranium proper broad, flattened above and very little narrowed between the orbits; a marked postorbital process; no defects of ossification in the palate; pterygoid fossa extending not nearly so far forwards as the posterior margin of the pa-

* De Blainville, 'Ostéographie: Insectivores,' p. 57, pls. iii., v., vii., viii., x.; Wagner, Schreber. Supplem. ii. p. 81, v. p. 534; Duvernoy, Mém. de Strasb. i. tab. i., ii., iii. p. 50; Dr. Andrew Smith, 'Zool. South Africa,' pl. xv.; Prof. Peters, 'Reise nach Mossambique,' p. 87, tab. xxii.; Geoff. St.-Hilaire, Ann. Sc. Nat. 1829, xviii. pp. 165–173.

† Prof. Peters, 'Reise nach Mossambique,' p. 92, tab. xxii., xxiii.; Wagner, Schreb. Supplem. v. p. 538.

‡ Prof. Peters, 'Reise nach Mossambique,' p. 100, tab. xxii., xxiii.; Wagner, Schreb. Supplem. v. p. 531.

late; præmaxilla very small; suboptic foramen conspicuous; infra-orbital canal very long, the lachrymal foramen opening in front of its posterior termination; angle of mandible very short; canine very much larger than the incisor, and with two roots; third lower molar considerably smaller than the first or second one. Eight lumbar vertebræ; cervical spines pretty well developed; ulna complete; only four digits to either manus or pes.

Hab. Eastern Africa.

Tupaidæ.

I. $\frac{\ }{3-3}$, C. $\frac{1-1}{1-1}$, M. $\frac{3-3}{3-3}$. Skull broadest between the posterior roots of the zygomata, which are complete and slender; orbits enclosed by bone or at least a postorbital process; dorsum of muzzle convex transversely; a tympanic bulla; an external alisphenoid canal; molar perforated; carotid and postglenoid foramina, but no suboptic foramen; foramen ovale a narrow aperture widely separated from the spheno-orbital opening; lachrymal foramen at margin of orbit or rather without it; coronoid process of mandible rising much above condyle; canine not close to premaxillary suture; upper molars with four more or less marked principal cusps and an external cingulum, which tends to form, with the two outer principal cusps, two triangular prisms. Thirteen dorsal, five to seven lumbar vertebræ; lumbar transverse processes not much antero-posteriorly extended; well-developed hyperapophyses; no hypapophyses; scapula with only a rudimentary metacromion; clavicles slender; a scapho-lunar bone and os intermedium; pelvic symphysis elongated; tibia and fibula distinct*; metatarsus but very little longer than the tarsus; five digits to each extremity; a cæcum.

Hab. South-eastern Asia and the Indian archipelago.

Tupaia†, Raffles.

Dentition: I. $\frac{2-2}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$. Skull much narrowed anteriorly; zygoma very slender; orbits large and completely encircled by bone; anterior margin of orbit sharply prominent; a process above the lachrymal foramen; temporal fossa very small; posterior margin of palate not thickened; small defects of ossification in palate; pterygoid fossa very small, and distant from palate; no paroccipital process; postglenoid process rudimentary; molar with a large perforation; foramen rotundum distinct from spheno-orbital fissure; a supraorbital foramen; infra-orbital canal long and narrow; posterior palatine foramen large; cingulum of upper molars developing cusps; triangular prisms

* I presume that *Ptilocercus* and *Hylomys* agree with *Tupaia* in this character.

† Horsfield's 'Zool. Researches,' 1824, 3 plates; Raffles, Linn. Trans. xiii. p. 257; Müller und Schlegel, Verhandl. 1839–1844; De Blainville, 'Insectivores,' pls. iii., vi., & x.; F. Cuvier's 'Dents des Mammifères,' no. xvii.; Owen's 'Odontography,' pl. cxi. fig. 3; Wagner, Schreb. Supplem. ii. p. 37, v. p. 525.

rather well developed; the two hinder upper premolars much more vertically extended than the true molars. Caudal vertebræ numerous.

Hab. South-eastern Asia and Indian archipelago.

Ptilocercus*, Gray.

Dentition: I. $\frac{2-2}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$. Skull much narrowed behind the postorbital processes; orbits very nearly encircled by bone; the anterior margin of each not sharply prominent; no process above the lachrymal foramen; temporal fossa large; posterior margin of palate slightly thickened; no defects of ossification in palate; pterygoid fossæ distant from palate; a ridge-like paramastoid process; postglenoid process rather large; malar perforation very small; foramen rotundum and spheno-orbital fissure represented by a single opening; no supraorbital foramen; infraorbital canal large but very short; posterior palatine foramen very small; external cingulum of upper molars not developing distinct cusps; last upper premolar much more vertically extended than the true molars. Caudal vertebræ numerous.

Hab. Borneo.

Hylomys†, Müller and Schlegel.

Dentition: I. $\frac{3-3}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{4-4}{4-4}$, M. $\frac{3-3}{3-3}$. Skull not much narrowed anteriorly, rather so between the orbits; only a small postorbital process; a process above the lachrymal foramen; no defects of ossification in palate; pterygoid fossæ extending forwards to posterior margin of palate; malar with a small perforation; infraorbital canal rather large, but not much elongated; no supraorbital foramen; external cingulum of upper molars not developing cusps; last upper premolar much more vertically extended than the true molars. Caudal vertebræ few in number.

Hab. Java, Sumatra, and South-eastern Asia.

Erinaceidæ.

I. $\frac{3-3}{\quad}$, C. $\frac{1-1}{1-1}$, M. $\frac{3-3}{3-3}$. Skull broadest between the posterior roots of the zygomata, which are complete though somewhat slender; no postorbital process; a ridge and process in front of orbit; temporal fossa large; pterygoid fossæ well developed; a transverse ridge at posterior part of palate, with a narrow transverse plate behind it; paroccipital and mastoid processes; nasals separate; malar imperforate, small, suspended in zygoma; tympanic a mere ring, not forming a bulla; a glenoid, but no distinct carotid fora-

* Gray, Proc. Zool. Soc. 1848, p. 24, and 'Zoology of Voyage of H.M.S. Samarang,' 1850, p. 18, pl. v.; Wagner, Schreber, Supplem. v. p. 528.

† Müller and Schlegel, Verhandl. i. p. 50, tab. xxv. figs. 4–7; Wagner, Schreber, Supplem. ii. p. 554, & v. p. 530; Blyth, Journal Asiatic Soc. Bengal, 1859, p. 293.

men; foramen rotundum distinct from sphenoidal fissure; optic nerve traversing an elongated and very small canal; a suboptic foramen; infraorbital canal rather long; no true alisphenoid canal; lachrymal foramen opens just in front of orbit; ascending ramus of mandible very concave externally; first two upper molars quadricuspid, with an oblique ridge in each connecting the postero-external cusp with the antero-internal one. Fourteen or fifteen dorsal vertebræ and five or six lumbar vertebræ; no hyperapophyses or hypapophyses; all lumbar processes small; clavicles slender; scapula with a long, pointed metacromion process; ulna complete and distinct; a scapho-lunar bone and os intermedium; pubic symphysis very small or absent; fibula anchylosed below to tibia; metatarsus short; five digits to each extremity; no cæcum.

Hab. Europe, Asia, Africa.

Erinaceus *, Linnæus.

I. $\frac{3-3}{2-2}$, P.M. $\frac{3-3}{2-2}$. Skull slightly constricted between the orbits; transverse plate behind the posterior palatine ridge continuous with outer walls of pterygoid fossæ; defects of ossification in palate; no external alisphenoid canal; mesopterygoid fossa ending posteriorly in an excavation of the *basis cranii*; suboptic foramen small and hidden; spheno-palatine foramen close to the foramen rotundum; upper canine small, generally with two roots; third upper and lower molars very small. Three sacral vertebræ; caudal vertebræ not numerous; spinous process of axis moderate; humerus generally with no supracondyloid foramen; tuberosity of ischium not much prolonged backwards; femur with a moderate ectogluteal ridge.

Hab. Europe, Asia, Africa.

Gymnura †, Vigors and Horsfield.

I. $\frac{3-3}{3-3}$, P.M. $\frac{4-4}{4-4}$. Skull much constricted between the orbits; transverse plate behind posterior ridge of palate not continuous with outer walls of pterygoid fossæ; no defects of ossification in palate; an external alisphenoid canal; mesopterygoid fossa not ending posteriorly in any excavation; suboptic foramen large and conspicuous; spheno-palatine foramen remote from foramen rotundum; upper canine large and conical, with one root; third upper molar quadricuspidate; third lower molar quite like the second. Five sacral vertebræ; caudal vertebræ numerous; spinous process of axis very large; tuberosity of ischium much prolonged backwards; femur with a very strong ectogluteal ridge.

Hab. Malacca, Sumatra.

* De Blainville, 'Insectivores,' p. 36, pls. vi., vii., viii., & x.; F. Cuvier, 'Dents des Mammifères,' no. xvi.; Owen, 'Odontography,' ii. pl. cx. fig. 5; Wagner, Suppl. ii. p. 10.

† De Blainville, 'Insectivores,' pls. vi. & x.; Owen, 'Odontography,' ii. pl. cxi. fig. 4; Horsfield and Vigors, Zoolog. Journ. iii. p. 246, pl. viii.; Wagner, Schreb. Supplem. ii. p. 45, v. p. 533.

Centetidæ.

I. $\frac{2-2}{---}$ or $\frac{3-3}{---}$, C. $\frac{1-1}{1-1}$, M. $\frac{3-3}{3-3}$. Skull very cylindrical, broadest between the glenoid surfaces; no zygoma; no postorbital process; no process and, generally, no ridge in front of the orbit; temporal fossa large; no pterygoid fossa; tympanic a mere ring, not forming a bulla; paroccipital and mastoid processes; nasals more or less united; malar imperforate; a glenoid, but no distinct carotid foramen; foramen rotundum one with sphenoidal fissure; optic foramen very small, but not forming a long canal; no suboptic foramen; infraorbital canal short and wide; lachrymal foramen opening close to, or just in front of, anterior margin of orbit; a true alisphenoid canal; no external alisphenoid canal; upper true molars each forming one triangular prism, the two external principal cusps of a quadricuspid molar being here represented by a single prominence; lower true molars with very small posterior processes. Fifteen to nineteen dorsal vertebræ; lumbar processes small; no hypapophyses in the trunk, but distinct hyperapophyses; scapula with an obtuse metacromion process; a supracondyloid foramen to humerus; mostly an os intermedium; pubic symphysis very small, sometimes widely open; tibia and fibula distinct*; metatarsus short; five digits to each extremity; no cæcum.

Hab. Madagascar and West Indies.

Centetes †, Illiger.

I. $\frac{2-2}{3-3}$ or $\frac{3-3}{3-3}$, P.M. $\frac{3-3}{3-3}$. No interorbital constriction; skull exceedingly cylindrical; posterior margin of palate thickened; mesopterygoid fossa ending posteriorly in an excavation of the *basis cranii*; slightly marked prominence from the inferior margin of the mandible, and placed some distance in front of the angle; a glenoid foramen; posterior palatine foramen large; no defects of ossification in palate; ascending ramus of mandible only slightly concave externally; canines long, pointed; apex of lower canine received into a fossa; first upper incisor small; second upper premolar not like the true molars; eighteen or nineteen dorsal vertebræ; a scapho-lunar bone; an os intermedium.

Hab. Madagascar.

Hemicentetes, Mivart.

I. $\frac{3-3}{3-3}$, P.M. $\frac{3-3}{3-3}$. No interorbital constriction; skull exceedingly elongated and tapering anteriorly; nasals partly united; infraorbital canal very short and wide; lachrymal foramen opening just in front of the anterior margin of the orbit; mesopterygoid fossa

* I presume that *Echinops* agrees with the other genera of the *Centetidæ* in this character.

† De Blainville, 'Insectivores,' pls. iv., vi., & x.; F. Cuvier, 'Dents des Mammifères,' no. xix.; Owen, 'Odontography,' pl. cx. fig. 6; Wagner, Schreb. Suppl. ii. p. 30, v. p. 582.

not ending posteriorly in an excavation of the *basis cranii*; a slightly marked prominence at the inferior margin of the mandible, a little in front of the angle of the jaw; posterior palatine framina rather large; no defects of ossification in the palate; anterior incisors very strongly bilobed; canines small; apex of lower canine not received into a fossa; first premolar above and below like the adjacent canine; second premolar, both above and below, separated from the first premolar by a larger interval than that which divides the first premolar from the canine; molars with the antero-posterior diameter greatly exceeding the transverse diameter of the same tooth; posterior prism of lower molars almost aborted. Fifteen or sixteen dorsal vertebræ; no os intermedium; scaphoid and semilunar bones distinct; pubic symphysis very small, sometimes widely open.

Hab. Madagascar.

Ericulus*, Is. Geoff.

I. $\frac{2-2}{2-2}$, P.M. $\frac{3-3}{3-3}$. No interorbital constriction; posterior margin of palate not thickened, and projecting much backwards beyond the last molars; mesopterygoid fossa ending posteriorly in an excavation of the *basis cranii*; no glenoid foramen; no defects of ossification in palate; posterior palatine foramen small; ascending ramus of mandible only slightly concave externally; canines not much elongated; second upper premolar shaped like the true molars; scaphoid and semilunar bones separate; an os intermedium. Sixteen dorsal and seven lumbar vertebræ; cervical spines rudimentary.

Hab. Madagascar.

Echinops†, Martin.

I. $\frac{2-2}{2-2}$, P.M. $\frac{2-2}{2-2}$. No interorbital constriction; posterior margin of palate not thickened, and projecting a little beyond last molars; mesopterygoid fossa not ending posteriorly in an excavation of the *basis cranii*; posterior palatine foramen small; ascending ramus of mandible only slightly concave externally; first upper incisor much larger than the second; canines not much elongated; second upper premolar shaped like the true molars.

Hab. Madagascar.

Solenodon‡, Brandt.

I. $\frac{2-2}{2-2}$, P.M. $\frac{4-4}{4-4}$. Skull not very cylindrical; cranium some-

* Is. Geoff. Mag. de Zool. 1839, p. 25; De Blainville, 'Insectivores,' pl. vi. & x.; Wagner, Schreb. Supplem. ii. pp. 33 & 551, & v. p. 584; Peters, Monatsber. Akad. Wissen. Berlin, 1865, p. 286.

† Martin, Trans. Zool. Soc. ii. p. 249, pl. xlvi.; Peters (*Echinogale*), Monatsbr. Akad. W. Berlin, 1865, p. 286; Wagner (*Echinogale*), Schreb. Supplem. ii. pp. 30 & 549, v. p. 585.

‡ Brandt, Mém. de Pétersb. 1833, 6th series, ii.; F. Poey, 'Memorias sobra la historia natural de la Isla de Cuba,' i. Habana, 1851, p. 23; Peters, Abhandlungen der K. Akad. der Wissen. zu Berlin, 1864, p. 1, pls. 1–3; De Blainville, 'Insectivores,' p. 53, pls. v. & ix.; Owen, 'Odontography,' pl. cxi. fig. 1; Wagner, Schreb. Supplem. ii. p. 79, v. p. 566.

what constricted between the orbits; posterior margin of palate thickened; a ridge in front of the orbit; mesopterygoid fossa not ending posteriorly in an excavation of the *basis cranii*; no paroccipital process; præmaxilla somewhat produced; ascending ramus of mandible deeply concave externally; condyle much transversely extended; a sharp process from the inferior margin of the mandible some distance in front of the angle; large glenoid foramen; posterior palatine foramen moderate; lachrymal foramen just in front of the orbit; first upper incisor much larger than the second; canine very small; apex of second lower incisor received into a fossa. Fifteen dorsal vertebræ; a scapho-lunar bone.

Hab. Hayti and Cuba.

Potamogalidæ *.

Potamogale, Du Chaillu.

Dentition: I. $\frac{3-3}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$. Skull not cylindrical; broadest between the glenoid surfaces; no zygoma; no postorbital process; no ridge or process in front of the orbit; temporal fossa large; no pterygoid fossa; no tympanic bulla; paroccipital processes directed backwards; nasals united; molar imperforate; very large precondyloid perforations; a small glenoid, but no distinct carotid foramen; foramen rotundum one with sphenoorbital fissure; optic foramen very small, but not forming a long canal; a suboptic foramen; infraorbital canal short and wide; no lachrymal foramen; a true alisphenoid canal; no external alisphenoid canal; upper true molars each forming two very narrow and approximated triangular prisms, the two external principal cusps of a quadricuspid molar being represented by two distinct prominences; lower true molars with rather large posterior processes. Sixteen dorsal vertebræ; caudal vertebræ numerous; lumbar processes small; decided hyperapophyses; scapula without a metacromion; no clavicles; no supracondyloid foramen to humerus; ulna complete and distinct; scaphoid and semilunar bones separate; no os intermedium; pubic symphysis very small; tibia and fibula anchylosed together below; five digits to each extremity; no cæcum.

Hab. Old Calabar.

Chrysochloridæ †.

I. $\frac{3-3}{3-3}$, C. $\frac{1-1}{1-1}$, M. $\frac{3-3}{3-3}$. Skull very broad and high, tapering sharply forwards; greatest breadth between the posterior roots of the zygomata, which are complete and rather deep arches; no post-

* Prof. Allman, Trans. Zool. Soc. vi. p. 1, pls. i. & ii.; Prof. J. V. Barboza du Bocage, 1ª Classa da Academia de 27 d'Abril, 1865, Lisbon, described under the name *Bayonia velox*; Peters, Monatsbr. Akad. W. Berlin, 1865, p. 286.

† De Blainville, 'Insectivores,' pls. v., vii., viii. & ix.; F. Cuvier, 'Dents des Mammifères,' no. xviii.; Owen, 'Odontography,' pl. cx. fig. 1; Wagner, Schreb. Supplem. ii. p. 118, v. p. 579; Peters, 'Reise nach Mossambique,' p. 69, tab. xxii.

orbital process; occiput not sloping much forwards; præmaxillæ peculiarly produced; lambdoidal ridge traversing summit of cranium; no ridge or process in front of orbit; a tympanic bulla; no alisphenoid canal; no pterygoid fossa; no paroccipital process; glenoid surface very small; ascending ramus of mandible very low, peculiarly truncated; coronoid process very low, a carotid foramen; a small glenoid foramen; sphenoidal fissure and foramen rotundum represented by one opening; infraorbital foramen large and single; lachrymal foramen minute; true molars each in the form of a triangular prism; first upper incisor larger than the second; canine small. Nineteen or twenty dorsal vertebræ; cervical neurapophyses not very narrow antero-posteriorly; no cervical hypapophyses; spines of dorsal and lumbar vertebræ well developed; no hyperapophyses; no hypapophysial ossicles beneath the lumbar vertebræ; manubrium slightly keeled, but not much enlarged; clavicles long and very slender; humerus not very short; ulna complete and distinct; scapula broad, with a blunt metacromion; scaphoid and semilunar distinct; no sickle-shaped carpal ossicle or os intermedium; pelvis widely open below; tibia and fibula anchylosed together inferiorly; four digits to manus, five to pes; no cæcum; an ossified tendon in the forearm.

Hab. Southern and Eastern Africa.

Chrysochloris, Lacépède.

M. $\frac{3-3}{3-3}$; a vesicular enlargement in the temporal fossa; lower molars without any posterior process.

Chalcochloris, St. G. Mivart.

M. $\frac{2-2}{2-2}$; no enlargement in the temporal fossa; lower molars with a marked posterior process.

Talpidæ.

C. $\frac{1-1}{\quad}$, M. $\frac{3-3}{3-3}$. Cranium very broad behind, but not high; tapering much, but gradually, forwards; greatest breadth behind the posterior roots of the zygomata, which are complete but exceedingly slender arches; occiput inclined much forwards; no postorbital process; no ridge or process in front of the orbit; temporal fossa small; a tympanic bulla; no alisphenoid canal; mesopterygoid fossa not ending posteriorly in any excavation of the *basis cranii*; foramen magnum very large; no paroccipital or mastoid processes; glenoid surface small, and situated high up; no distinct postglenoid process; ascending ramus of mandible not very low; supraoccipital enormous; generally a large pterotic; meatus auditorius externus opening decidedly below the glenoid surface; a carotid, but no glenoid foramen; foramen rotundum and spheno-orbital fissure represented by one opening; infraorbital foramen very large; lachrymal foramen very small; molars above and below, each formed of two triangular prisms. Cervical neurapophyses very narrow antero-

posteriorly; no cervical hypapophyses; spines of dorsal and lumbar vertebræ small; no hyperapophyses; autogenous hypapophysial ossicles beneath the interspaces of the lumbar vertebræ; manubrium keeled; scapula long and very narrow; radius and ulna distinct; an os intermedium; no symphysis pubis; tibia and fibula confluent below; five digits to each extremity; no cæcum.

Hab. Europe, Asia, including Japan, and North America.

Talpina.

No distinct pterygoid fossa*; pterygoid region inflated; coronoid process not very elevated; spiculum of bone bounding infraorbital foramen above very narrow; as many as three incisors above; manubrium very elongated; clavicles very short and broad; no metacromion process; a sickle-shaped carpal ossicle.

Hab. Europe, Asia, North America.

Talpa†, Linnæus.

I. $\frac{3-3}{2 \text{ or } 3-3 \text{ or } 2}$, C. $\frac{1-1}{1-1}$‡, (?) P.M. $\frac{4-4}{4-4}$, M. $\frac{3-3}{3-3}$. Cranium very slightly constricted between the orbits; palate with no posterior thickening, but a small defect of ossification on each side; a very large pterotic; a fissure bordering epiotic; posterior palatine foramen large; anterior palatine foramen small; all the incisors very small; upper canine very elongated; lower canine small; posterior cusps of premolars very small. Five or six lumbar vertebræ; caudal vertebræ few; ultimate phalanges of manus much the longest, bifurcating.

Hab. Europe and Asia.

Condylura §, Illiger.

I. $\frac{3-3}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{4-4}{4-4}$, M. $\frac{3-3}{3-3}$. No fissure bordering epiotic; meatus auditorius with a very large external opening; muzzle much attenuated anteriorly; first and third upper incisors much larger than the second; upper canine very small; lower canine much larger than lower incisors; lower third incisor much smaller than the first or second; posterior cusps of premolars very large. Seven

* I cannot be sure as to *Condylura* in this respect.

† De Blainville, 'Ostéographie: Insectivores,' pls. i., v., & ix.; F. Cuvier, 'Dents des Mammifères,' no. xxii.; Owen, 'Odontography,' pl. cx. fig. 3; C. Giebel, Zeitschr. f. d. ges. Naturwiss. Halle, Bd. xii. 1858, pp. 395–450; Wagner, Schreb. Supplem. ii. p. 106, v. p. 576.

‡ Mr. C. Spence Bate, F.R.S., in a paper read at the Odontological Society of Great Britain (published in the 'Annals and Mag. of Nat. Hist.' for June 1867), states that the tooth here called canine is implanted in the præmaxilla. The conflicting nature, however, of the remarks contained in that paper render other observations necessary.

§ De Blainville, 'Insectivores,' pls. i., v., & ix.; F. Cuvier, 'Dents des Mammifères,' no. xxii. bis; Wagner, Schreb. Supplem. ii. p. 113, v. p. 574; S. F. Baird, 'Mammals of America,' p. 71.

lumbar vertebræ; caudal vertebræ numerous; ultimate phalanges of manus not bifurcating.

Hab. North America.

Scapanus *, Pornel.

I. $\frac{3-3\dagger}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{4-4}{4-4}$, M. $\frac{3-3}{3-3}$. No fissure bordering the epiotic; cranium with a very slight interorbital constriction; palate not extending back beyond the last molars; first upper incisor much larger than the second or third one; the two upper posterior incisors, the upper canine, and first two premolars all of nearly the same size; lower incisors, canines, and premolars very gradually increasing in size from before backwards.

Hab. North America.

Scalops ‡, Cuvier.

I. $\frac{3-3}{2-2}$, C. $\frac{1-1}{0-0}$, P.M. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$. Cranium with a very marked interorbital constriction; no fissure bordering the epiotic; palate extending back beyond the last molars; first incisor very large, second and third minute; upper canine long and conical, and much more vertically extended than the first upper premolar; second lower incisor much larger than the first.

Hab. North America.

Myogalina.

A distinct pterygoid fossa; pterygoid region not inflated; no open fissure bordering opiotic; coronoid process very lofty; never as many as three incisors above §; first upper incisor longest tooth of upper jaw; manubrium not very large; clavicle and humerus elongated; a metacromion process; no sickle-shaped carpal bone.

Myogale ||, Cuvier.

I. $\frac{2-2}{2-2}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{5-5}{5-5}$, M. $\frac{3-3}{3-3}$. Cranium with a very marked interorbital constriction; palate prolonged beyond the last molar,

* Pornel, Bulletin de la Soc. Géologique de France, 1849, vi.; S. F. Baird, 'Mammals of N. Western America,' p. 58, pl. xxx.; Le Conte, Proc. of Acad. of Philadelphia, vi. p. 326; Bachman, Journ. Acad. Nat. Sci. Phil. viii. 1839, p. 58; Wagner, Schreb. Supplem. v. p. 574.

† Prof. Peters considers that there are but four upper incisors.

‡ De Blainville, 'Insectivores,' pls. v. & ix.; F. Cuvier, 'Dents des Mammifères,' xxii.; Owen, 'Odontography,' pl. cx. fig. 2; Giebel, Zeitschr. f. d. ges. Naturwiss. Halle, Bd. xii. 1858, pp. 395–405; Wagner, Schreb. Supplem. ii. p. 102, v. pp. 571, 807; Baird, 'Mammals of America,' p. 58, pl. xxx.; Bachman, Boston Journal N. H. 1843, ii. p. 28; Le Conte, Proc. of Acad. of Philadelphia, vi. p. 326.

§ Possibly there may also be only four upper incisors in *Scalops* and *Scapanus*.

‖ J. F. Brandt, Archiv fur Natur. 2 Jahrg. 1836, i. p. 176; Geoff. Mém. du Mus. i. tab. xv. figs. 10–12, 1815; De Blainville, 'Insectivores,' pls. ii., v., and ix.; F. Cuvier, 'Dents des Mammifères,' no. xxi.; Wagner, Schreb. Suppl. ii. p. 95, v. p. 567.

its posterior margin thickened; a large perforation in each exoccipital; anterior palatine foramen very large; infraorbital foramen bounded above by a broad spiculum of bone; the *very* small lachrymal foramen opens at the anterior side of the upper end of the spiculum; first upper incisor the largest and longest of all the teeth; second upper incisor very small. Cervical neurapophyses mere filaments; many caudal vertebræ; pes rather or very elongated, both absolutely and compared with manus.

Hab. Eastern and Western Europe.

Urotrichus *, Temminck.

I. $\frac{2-2}{1-1}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{4-4}{4-4}$, M. $\frac{3-3}{3-3}$. Lachrymal foramen immediately above the middle of the infraorbital foramen; no large exoccipital perforation; infraorbital foramen bounded above by a very slender spiculum of bone; second upper incisor of considerable size, though not nearly so large as the first incisor. Few caudal vertebræ; pes not elongated.

Hab. Japan and Western N. America.

Soricidæ.

Sorex †, Linnæus.

I. $\frac{4-4}{1-1}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{2-2}{1-1}$, M. $\frac{3-3}{3-3}$,

or I. $\frac{3-3}{1-1}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{2-2}{1-1}$, M. $\frac{3-3}{3-3}$,

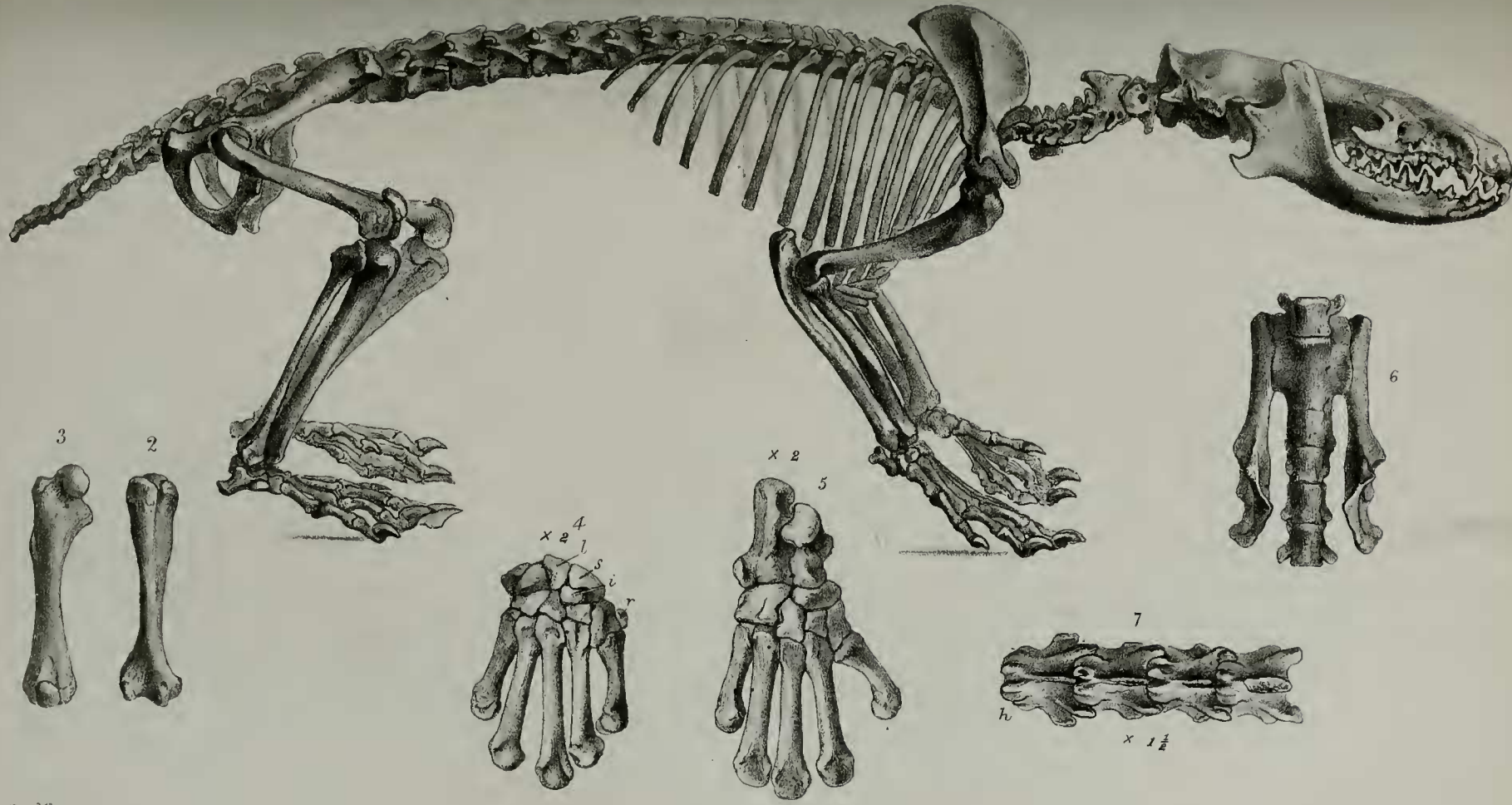
or I. $\frac{3-3}{1-1}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{1-1}{1-1}$, M. $\frac{3-3}{3-3}$,

or I. $\frac{2-2}{1-1}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{1-1}{1-1}$, M. $\frac{3-3}{3-3}$.

Cranium broad behind, tapering forwards; greatest breadth behind the glenoid surfaces; no postorbital process; occiput sloping much forwards; no pterygoid fossa; no zygoma; pterygoid region not inflated; mesopterygoid fossa ending posteriorly in no excavation of the *basis cranii*; tympanic a mere ring, not forming a bulla; no alisphenoid canal; a large aperture on each side of the base of the skull; large and anteroverted postglenoid processes; foramen rotundum and sphenoidal fissure represented by one opening; infraorbital foramen considerable, limited above by a thick bar of bone; inside of ascending ramus of mandible with a peculiar and deep excavation; articular surface of condyle looking backwards; angle very attenuated; first incisor much larger than the others, and always with two cusps; upper canine always smaller than the smallest upper

* Temminck, 'Fauna Japon.' i. p. 22, tab. iv. figs. 6–11; Wagner, Schreber, Suppl. v. p. 569; Spencer F. Baird, 'Mammals of America,' p. 76, pl. xxviii.

† De Blainville, 'Insectivores,' pls. ii., v., and x.; F. Cuvier, 'Dents des Mammifères,' no. xx.; Owen, 'Odontography,' pl. cx. fig. 4; Duvernoy, Magasin de Zoologie, 1842; Wagner, Schreb. Suppl. i. p. 47, v. pp. 539 and 802; Dr. E. Brandt, Russian Memoir of 1865, before referred to; Spencer F. Baird, 'Mammals of America,' pp. 7–56.



Westley lith.

M&N,Hanhart. imp

ERICULUS NIGRESCENS

incisor; upper molars with two triangular prisms; lower incisor very elongated; lower canine smallest tooth of mandible. Thirteen to fifteen dorsal vertebræ; five or six lumbar vertebræ; large cervical hypapophyses; no lumbar hypapophysial ossicles; well-marked hyperapophyses; manubrium broad, but not keeled; clavicle small and slender, not joining humerus; scapula short and broad; a bifurcating acromion process; generally a supracondyloid foramen in humerus; radius and ulna distinct; no sickle-shaped bone or os intermedium in carpus; ultimate phalanges not bifurcating; pelvis narrow, symphysis widely open; femur with a third trochanter; tibia and fibula confluent below; five digits to each extremity; no cæcum.

Hab. The Old World, and North America.

DESCRIPTION OF PLATE V.

Fig. 1. Skeleton of *Ericulus*, slightly less than the natural size.
2. Right humerus, seen in front.
3. Right femur, seen in front.
4. Right carpus and metacarpus, twice the natural size: *i*, os intermedium; *l*, lunare; *r*, radial sesamoid ossicle; *s*, scaphoides.
5. Right tarsus and metatarsus, twice the natural size.
6. Pelvis seen on its abdominal side, showing the separation of the pubic bones.
7. Four lumbar vertebræ, once and a half the natural size: *h*, hyperapophysis.

5. Descriptions of some new Species of Exotic Lepidoptera. By Arthur Gardiner Butler, F.L.S., F.Z.S., &c.

[Received January 11, 1871.]

Genus Amauris, Hübner.

Amauris inferna, n. sp.

Front wings above as in *A. egialea*, but the two large central hyaline patches wider apart, and the two central spots of the oblique subapical series placed as in *A. ccheria*. Hind wings above and below almost as in *A. hecate*, but the shape of *A. damocles*. Front wings below with paler apical area; three white points at centre of outer margin.

Expanse of wings 3 inches 6½ lines.

Hab. West Africa. Coll. W. W. Saunders.

Genus Danais, Latreille.

Danais ino, n. sp.

Front wings as in *D. limniace*, but with only three small spots in the obliqne series beyond the cell; the interno-basal streaks united in the middle. Hind wings almost as in *D. choaspes*; no discoidal black streak, but the basal patch between median and submedian

nervures divided by a streak, as in *D. limniace*. Wings below spotted and streaked as above; the apex of front wings and the whole of hind wings brownish ochraceous.

Expanse of wings 3 inches $2\frac{1}{2}$ lines.

Hab. Sula (*Wallace*). Coll. W. W. Saunders.

The natural position of this species is between *D. australis* and *D. choaspes*.

Genus Romaleosoma, Blanchard.

Romaleosoma janetta, n. sp.

Front wings above blue-black, the interno-basal area yellowish green; a large green-tinted yellow subapical patch. Hind wings green; yellowish towards apical area; a red spot between bases of costal and subcostal nervures; apex to second median branch broadly black, exhibiting a submarginal series of blacker spots, edged externally with green, and continuing to interspace between first and second median branches; anal margin narrowly black; internal area brown. Body dark brown. Wings below nearly as in *R. cato*, but the black spots differently disposed; both wings plum-coloured at base.

Expanse of wings 3 inches 8 lines.

Hab. Fantee, Cape Coast (*Ussher*). Coll. Swanzy.

We have this species also in the British Museum; it comes nearest to *R. cato*, from which, however, it is readily distinguishable.

Genus Harma, Westwood.

Harma lurida, n. sp.

♂. Wings above golden ochraceous, basal area (including almost the whole of hind wings) orange, tinted and dusted with brown atoms; the margin narrowly and regularly black-brown. Hind wings with a submarginal series of black spots, nearly touching the brown border, and towards anal angle a discal series of three or four hastate spots; abdominal margin black-brown. Body brown. Wings below greyish brown, with central dark ferruginous line from third median branch of front to anal angle of hind wings; the usual discoidal rusty black-edged markings and three pale spots near the base; outer margin varied with white and bounded internally by a double lunated brown line; a submarginal series of black and white points.

Expanse of wings 3 inches.

Hab. Fantee, Cape Coast (*Ussher*). Coll. Swanzy.

Belongs to the *Egesta* group.

Genus Aterica, Boisduval.

Aterica felicia, n. sp.

♀. Wings above brown. Front wings with usual ochre-encircled discoidal markings; basal area terminated by a narrow, strongly arched, and somewhat angulated ochreous streak; a discal chain-band and submarginal line also ochreous; three white points near

apex. Hind wings—basal area abruptly limited by a somewhat arched and wedge-shaped ochreous patch, which towards the apex unites with a geminate ochraceous chain-band enclosing internally black hastate spots. Body above blackish. Wings below greyish, paler than above. Front wings with white oblique band; chain-like markings less distinct than above. Body below grey.

Expanse of wings 2 inches 11½ lines.

Hab. Fantee, Cape Coast (*Ussher*). Coll. Swanzy.

Allied to *A. opis*, Drury.

Aterica zonara, n. sp.

♂. Wings above tawny, with three macular brown bands, the outermost distinctly separated into spots; the costa and outer margin of front wings, some irregular basal characters, the base of hind wings, and a submarginal broken line in hind wings dark brown; fringe blackish. Body above dark tawny. Wings below pale tawny; a dentate, sinuate, submarginal brown line, and a series of black discal points. Front wings with a black spot, and 8-shaped marking within the cell; a second marking, less distinct, at end of cell, and a series, very indistinct, terminating basal area; a squamose, oblique, blackish streak from apex to below first median branch. Hind wings with three black spots in cell, which is surrounded by an irregular series of tawny blackish-edged markings, enclosing a pale notched lunate patch, which crosses discocellular, median, and submedian interspaces. Body below greyish.

Expanse of wings 2 inches 4 lines.

♀. Wings above brown, with pale ochreous markings answering to ground-colour of male; hind wings with pale ochreous patch, nearly as in the preceding species, but narrower and more diffused externally; wings below as in the male, but paler.

Expanse of wings 2 inches 6 lines.

Hab. Fantee, Cape Coast (*Ussher*). Coll. Swanzy.

Belongs to the *Absolon* group.

Genus Deilephila.

Deilephila spinifascia, n. sp.

Intermediate between *D. livornica* and *D. galii*. Front wings with a pale median ochraceous band, as in *D. livornica*, throwing off five or six recurrent spine-like streaks along nervures towards costal area. Hind wings as in *D. galii*, excepting that the white spot near anal angle is placed above the line of the rosy band, and is bounded on both sides by black. Body differs from that of *D. galii* in that it exhibits five, more or less, black decreasing bands on each side of the central brown stripe. Wings below freckled with blackish scales, otherwise almost as in *D. galii*.

Expanse of wings 3 inches.

Hab. Buenos Ayres (*Burmeister*). B.M.

This species, the following, and *Dirphia venata* were sent to the

British Museum some time ago, with the request that (in case of their proving to be new) I should describe them.

Genus Sphinx.

Sphinx diffissa, n. sp.

Wings above greyish ochraceous; fringe alternately brown and white. Front wings with an irregularly dentated waved black line, edged interiorly with whitish from costa to near anal angle, and united with apex near costa by an irregular oblique broken black line; basal area irregularly marbled and streaked with dark grey scaling; a whitish point at end of cell, and another quite white at base. Hind wings pale grey, crossed by two white bands, bounded on either side by blackish; the outermost blackish border broad, especially towards costa, and terminating at anal angle. Thorax greyish ochraceous, marbled with blackish; a yellow point on each side of the collar. Abdomen black at base, with a yellow point on each side; a central grey-brown stripe, and on either side a series of five golden-yellow spots, encircled with black. Wings below pale greyish ochraceous; a whitish band traversing the wings from costa of front to anal angle of hind wings. Body pale greyish.

Expanse of wings 3 inches 6 lines.

Hab. Buenos Ayres (*Burmeister*). B.M.

Allied to *S. carolina* and *S. lucetius*.

Genus Pericopis, Hübner.

Pericopis rosina, n. sp.

♀. Wings above brown; front wings with three broad and almost connected semihyaline bands, the first at base, the second from centre of costa to near anal angle, the third (just beyond and almost touching the second) from costa to near centre of outer margin; a red point at base. Hind wings blackish, with a narrow submarginal, anal, rosy, macular band, and two spots of the same colour between median and subcostal branches; three or four nearly marginal anal white points; fringe brown. Body blackish. Wings below rather paler; front wings with darker basal area; apical area exhibiting two broad white patches in place of the two exterior bands of upper surface. Hind wings with red spot at base; outer rosy spot of submarginal series wanting. Abdomen with brown centre, flecked on each side with squamose creamy points, and terminating in two golden-yellow spots.

Expanse of wings 2 inches 8 lines.

Hab. Ega (*Bates*). B.M.

Allied to *P. leucophæa* of Walker.

Genus Eucyane, Walker.

Eucyane hystaspes, n. sp.

Wings above black, basal area brilliant metallic green; front

wings with a narrow, central, oblique crimson band; apex white-tipped. Body brilliant metallic green; fringe white-flecked at apex and near anal angle; wings below nearly as above; the hind wings with two red points placed obliquely immediately beyond green area. Body—thorax brownish, legs streaked with white; abdomen with central scarlet band, surrounded with brown, and interrupted by whitish annulations.

Expanse of wings 2 inches 5 lines.

Hab. Venezuela (*Dyson*). B.M.

Allied to *E. glauca* of Cramer, from Surinam, but perfectly distinct. The nearest approach to the type form in the British Museum is an example from Ega, with red-tinted white band in front wings; but even in this example the band of hind wings is different in form and position.

Genus Phægorista.

Phægorista similis, Walker.

♂. Wings above crimson; front wings with apical area dark brown, a subapical fasciole, a spot near the anal angle, and the internervular fringes white. Hind wings with moderately broad dark-brown outer margin; fringe white-spotted. Thorax dark brown, white-streaked; antennæ dark brown; base of the abdomen orange, apex orange-tinted, central portion black, with white annulations. Below nearly as above.

Expanse of wings 2 inches 11 lines.

Hab. Fantee, Cape Coast (*Ussher*). Coll. Swanzy.

This is doubtless an imitation of *Atelis helcita* of Linnæus, which it closely resembles. The female is described by Mr. Walker.

Genus Dirphia*.

Dirphia venata, n. sp.

Wings above smoky brown; the internal area of front wings and the whole of the hind wings (excepting the margin) in male whitish brown; nervures blackish, especially in front wings; a large rounded black spot at end of hind-wing cell. Body above smoky brown; metathorax of male clothed with lighter hairs; antennæ ferruginous; wings below more uniform in colour, the markings scarcely defined. Body below dark smoky brown.

Expanse of wings: ♂ 4 inches, ♀ 4 inches 4 lines.

Hab. Buenos Ayres (*Burmeister*). B.M.

This handsome species is nearly allied to a female insect deseribed by Mr. Walker as that sex of *Heliconisa impar*; its natural position in the genus is probably near *D. ursina*. I would propose for the female placed with *H. impar* the name of *Dirphia lancea*.

* A third allied *Dirphia* has been characterized and figured by Blake (Proc. Ent. Soc. Philad. 1864) as a new genus and species under the name of *Coloradia pandora*.

6. Notes on the Types of *Tyrannula mexicana* of Kaup, and *Tyrannula barbirostris* of Swainson. By P. L. Sclater, M.A., Ph.D., F.R.S.

[Received January 13, 1871.]

Dr. Kaup's *Tyrannula mexicana*, shortly described in this Society's 'Proceedings' for 1851 (p. 51), has long been a stumbling-block to those engaged on American ornithology. I was originally inclined to believe it to be the same as *Myiarchus lawrencii* (see P. Z. S. 1856, p. 296, et Cat. A. B. p. 233). Prof. Baird has identified it with *M. cinerascens*, Lawrence (*cf.* B. N. A. p. 179); and his view has been usually followed by American naturalists.

Prof. Baird and Mr. Lawrence have both lately applied to me to clear up this point, and have supplied me with skins of the allied species for comparison with Kaup's type, which they believed to be in the Derby Museum, Liverpool. This, however, is not the case, as I ascertained last summer during the visit of the British Association to Liverpool. Indeed Kaup says (*l. s. c.*), "Mr. Wollweber sent me this species, which I also found in the British Museum." In the British Museum I ascertained that Kaup's type, if present, was not marked, and was accordingly forced as a last resource to apply to Dr. Kaup himself. Dr. Kaup, with his usual kindness, immediately forwarded to me the desired specimen from the Grand-Ducal Museum of Darmstadt, which I now exhibit.

Taking as a guide Prof. Baird's diagnosis of the difficult species of this group in his standard work on North-American Birds (p. 177), it will be seen at once, on examination of the typical specimen of *Tyrannula mexicana*, that it cannot be referred either to *Myiarchus mexicanus* (i. e. *M. cinerascens* of Lawrence) or to *M. lawrencii*, inasmuch as it has the "inner web of the tail-feathers broadly rufous to the extreme tip"—thus coming into Sect. A of the genus, which includes only *M. crinitus* and *M. cooperi*. Further comparison leads me to believe that the bird is really undistinguishable from *M. cooperi*, as here described by Baird. It is certainly rather smaller in dimensions than two of my skins of this species, and has the bill smaller. But a third specimen in my collection*, which I also refer to the (so-called) *M. cooperi* of Baird, agrees very well with it in general dimensions, and has the bill even slightly smaller. I do not, therefore, hesitate to decide that *Tyrannula mexicana* of Kaup is identical with *Myiarchus cooperi* of Baird†.

* Obtained at Atlisco, in the State of Puebla, by Boucard.

† What *Tyrannula cooperi*, Kaup, is (which Prof. Baird believed to be this *Myiarchus*) does not now much signify. The original *Muscicapa cooperi* of Nuttall is certainly *Contopus borealis* (*vide* Baird, B. N. A. p. 188). But it is not to be supposed that Prof. Kaup would make two species of the same bird in the same paper. Therefore *Tyrannula cooperi* of Kaup is probably not *Myiarchus cooperi* of Baird.

This point being settled, the following changes must be made in the nomenclature of the four species of *Myiarchus* differentiated by Baird (B. N. A. p. 177):—

(1) *Myiarchus cooperi* of Baird must stand as *Myiarchus mexicanus* (Kaup), being, as just proved, *Tyrannula mexicana*, Kaup, P. Z. S. 1851, p. 51.

(2) *Myiarchus mexicanus* of Baird must stand as *Myiarchus cinerascens*, Lawrence.

A second obscure type among the Mexican Tyrannidæ that I have lately met with is *Tyrannula barbirostris* of Swainson, Phil. Mag. 1827, p. 367. The specimen upon which this species was founded is now in the Cambridge Museum, and is labelled in Swainson's own handwriting. It agrees exactly with *Blacicus tristis* (Gosse); Scl. Cat. A. B. p. 234—a well-known species of Tyrant-birds from Jamaica. There is no doubt, therefore, I think, that there has been an error in locality here, and that the species may be expunged from the Mexican list, whilst the Jamaican *Blacicus* must adopt the name *barbirostris* instead of the subsequently given term *tristis* of Gosse.

7. Remarks on some Species of *Dendrocolaptidæ* in the Collection of the Smithsonian Institution. By P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received January 13, 1871.]

In a series of skins of birds of the family Dendrocolaptidæ submitted to me for determination by the authorities of the Smithsonian Institution are several specimens of much interest, and concerning which I beg leave to offer a few remarks to the Society.

1. Synallaxis candæi.

Synallaxis candæi, Lafr. et D'Orb. Rev. Zool. 1838, p. 165; Bp. Consp. i. p. 213.

Castanea: pileo toto et capitis lateribus sordide nigris: mento et gulæ lateribus utrinque albis: gula media nigra: ventre medio albo: cauda castanea, rectricibus decem, harum sex mediis nigricante late terminatis: long. tota 6, *alæ* 2·3, *caudæ rectr.* 3, *lat.* 1·2, *poll. Angl.*

Hab. Cartagena (*Candé*); Rio Hacha (*Delattre*, in Mus. Derb.); Savanilla (*Ashurst*).

I have previously seen examples of this rare and pretty *Synallaxis* only in the Derby and Berlin Museums. It appears to be restricted to the northern littoral of Columbia. Its nearest ally known to me is *S. kollari*, Pelzeln *, from the Rio Brancho, in which, however,

* Orn. Bras. p. 36.

the ear-coverts are not black, and the feathers in the middle of the throat are tipped with white.

The Smithsonian skin of this species is from Savanilla, collected by Mr. Ashurst.

2. ANABATES OCHROLÆMUS, Tschudi, Faun. Per. *Aves*, p. 240, tab. xx. fig. 2.

A typical specimen of this bird received by the Smithsonian Institution from Neuchâtel in exchange enables me to identify this species with *Anabates turdinus* of Natterer's MS. (Pelz. Orn. Bras. p. 41). It agrees very nearly with a Nattererian example in my own collection, and with a second specimen in the Smithsonian collection from the Huallaga. Mr. E. Bartlett obtained the same species on the Upper Ucayali (see Scl. et Salv. P. Z. S. 1866, p. 184).

This species must therefore now stand as *Philydor ochrolæmus* (Tsch.). I should remark that I have also one of Tschudi's original specimens of this species in my own collection (*Automolus ochrolæmus* of my C. A. B. p. 158), but had not previously recognized the identity of the two species.

3. ANABATES MONTANUS, Tsch. F. P. *Aves*, p. 240, tab. xx. fig. 1.

A typical example of this species acquired from the same source proves its identity with *Philydor striaticollis* of my American Catalogue. As the latter MS. name of Lafresnaye was only published by me in 1857, Tschudi again has priority, and the species must stand as *Philydor montanus*.

4. DENDROCOLAPTES CHUNCOTAMBO, Tsch. F. P. *Aves*, p. 241, tab. xxxii. fig. 1.

A typical specimen of this species is likewise in the Smithsonian collection. It is the same as *Dendrocolaptes ocellatus* of Spix (Av. Bras. i. p. 88). At least it agrees with the specimens now thus determined in my own collection, which are four in number, namely:—

a. Gualaquiza, Ecuador (*Fraser*) } =*D. palliata*, Scl. Cat. A. B.
b. R. Huallaga (*Hawxwell*) } p. 164.
c. Rio Negro (*Natt.*)=*D. ocellata* of Pelzeln, Orn. Bras. p. 45.
d. Xeberos (*Bartlett*).

Since I published my catalogue I have compared specimens *a*, *c*, and *d* with the marked types of *D. weddelli** in the Paris Museum and found them identical with it, and not with *D. palliata*, as I had formerly supposed.

It is with great satisfaction, therefore, that I am able to say that Tschudi's ugly name is merely a useless synonym of *Dendrornis ocellata*.

* Des Murs, in Castelnau's Voy. Ois. p. 46.

8. A List of Additional Species of Marine Mollusca to be included in the Fauna of Port Jackson and the adjacent Coasts of New South Wales. By George French Angas, F.L.S., F.R.G.S., C.M.Z.S., &c.

[Received January 11, 1871.]

In the year 1867 I published in these 'Proceedings'* a list of all the species of marine mollusks which up to that date had been ascertained by me to inhabit Port Jackson and the waters in its vicinity. Since then many additional forms have been obtained, a number of which were new to science and have lately been described; whilst others, though well known, had not hitherto been met with in the particular region towards which my researches have more especially been directed.

I am particularly indebted to Mr. John Brazier of Sydney for dredged specimens and *positive* information regarding the habitat of very many species; also to Dr. Cox of Sydney for notes on the localities of certain shells concerning which I had hitherto been in doubt.

As molluscan discoveries progress, many new species and even genera will doubtless be brought to light from so prolific a region; in the mean time I add the following list of 109 additional species, together with a few remarks on their characters, habits, and distribution, to form an appendix to my list of 1867.

Class GASTEROPODA.

Fam. Tritoniidæ.

1. Tritonium labiosum.

Triton labiosus, Wood, Index Test. Supp. pl. 5. f. 18.
Tritonium rutilum, Menke, Moll. Nov. Holl.; Reeve, Conch. Icon. *Triton*, pl. 14. f. 52 *a*, *b*, *c*.

A small compact species, longitudinally ribbed, and transversely grooved, somewhat variable in form. Length about 10 lines.
Found alive on Shark Island, Port Jackson (*Brazier*).

2. Triton (Epidromus) brazieri, Angas, P. Z. S. 1869, p. 46, pl. ii. f. 3.

An elongately turreted shell with twelve varices. It is longitudinally ridged, and reticulated with irregular impressed striæ. There is a dark fascia on the middle of each whorl, and also a series of small spots at the lower edge of the fascia of the last whorl. Length 2 inches.
Lake Macquarie and Cape Solander, Botany Bay (*Brazier*).

* "A List of Species of Marine Mollusca found in Port-Jackson Harbour &c." (Part I., P. Z. S., 1867, p. 185; Part II., P. Z. S. 1867, p. 912).

3. Triton (Cumia) speciosa, Angas, P. Z. S. 1871, Pl. I. f. 1.

A small beautifully sculptured white species, having upwards of twenty varices, and sometimes a pale chestnut band on the last whorl. It appears to belong to that group of the *Tritoniidæ* to which the subgeneric name of *Cumia* has been given, of which *Triton convolutus*, Brod., may be regarded as the type.

The largest specimen I have seen measures 8 lines. Mr. Brazier obtained it living at Green Point, Watson's Bay, Port Jackson.

4. Ranella pusilla, Brod. P. Z. S. 1832, p. 194.

This pretty little species, hitherto known from the tropical Pacific Islands, has been found at Broken Bay (*Brazier*).

Fam. Dactylidæ.

5. Amalda cingulata.

Ancillaria cingulata, Sow. Species Conch. pl. 6. f. 36, 37.

Several specimens of this beautiful shell have been met with at Brisbane Water and Broken Bay. It varies in length from 3 to $4\frac{1}{2}$ inches.

The animal, Dr. Cox informs me, is 10 inches in diameter.

6. Olivella exquisita, Angas, P. Z. S. 1871, Pl. I. f. 2.

A charming little species, with three rows of chestnut spots connected by fine undulating lines.

Coodgee Bay, New South Wales (*Brazier*).

Fam. Volutidæ.

7. Voluta fusiformis, Swains.; Reeve, Conch. Icon. *Voluta*, pl. 3. f. 6.

A broken example of this fine Volute has been found on the beach at Broken Bay—probably its northernmost range. It was hitherto regarded as exclusively Tasmanian.

8. Voluta punctata, Swainson, Zool. Illus. 1st series, pl. 161; Reeve, Conch. Icon. *Voluta*, pl. 21. f. 52.

The very bad figure given in Reeve, taken from an immature and much worn specimen in the British Museum, gives but a faint idea of this rare shell. Its locality was unknown until very recently, when several examples were obtained by Mr. Brazier from the outer beach at Broken Bay.

9. Voluta zebra, Leach, Zool. Miscell. vol. i. pl. 12. f. 1.

Port Stephen Heads.

The more elongated and closely lined variety, described by Leach as *V. lineata*, has been found by Mr. Brazier on the beach at Lake Macquarie.

10. Voluta nucleus, Lam. Anim. sans Vert. vol. x. p. 405; Reeve, Conch. Icon. *Voluta*, pl. 18. f. 41.

Newcastle, New South Wales (*Brazier*).

Fam. Mitridæ.

11. Mitra glabra, Swains. Exotic Conch. pl. 24.

Botany Bay. Occurs also in South and Western Australia.

12. Mitra variabilis, Reeve, P. Z. S. 1844, p. 175.

A species of a brownish-olive colour, with a zone of interrupted grey markings near the middle of the last whorl, and a few irregular flakes of the same colour descending from the sutures. The whorls are more or less encircled by finely punctured striæ. Length $1\frac{1}{2}$ inch.

Under stones at Double Bay (Port Jackson) and Brisbane Water (*Brazier*).

The shells under the above name in the Cumingian Collection in the British Museum are identical with *M. cylindrica*. I cannot find Reeve's original type; but the specimens sent me by Mr. Brazier agree with his description of *M. variabilis*.

Subfam. Columbellinæ.

13. Columbella interrupta, Angas, P. Z. S. 1865, pl. 11. f. 9, 10.

This beautiful little species may be known by its two green finely pencilled and scalloped bands.

The type specimen was dredged by me at Yorke's Peninsula, in South Australia. Mr. Brazier has recently obtained it in Port Jackson.

14. Columbella (Mitrella) bicincta, Angas, P. Z. S. 1871, Pl. I. f. 3.

A smooth fusiform species, distinguished by having two opaque white bands articulated with brown above and below the sutural margin.

Dredged in Watson's Bay, Port Jackson.

15. Columbella (Mitrella) attenuata, Angas, P. Z. S. 1871, Pl. I. f. 4.

An elegant little species, remarkable for its very elongated form, and its simple bands of light and dark brown.

Dredged near the "Sow and Pigs," Port Jackson (*Brazier*).

16. Columbella (Anachis) atrata, Gould, Otia, p. 131.

In my "List of Port-Jackson Shells" (Part I. No. 55) I erroneously gave the name *C. lentiginosa*, Hinds, to this species, which is a very distinct shell, and comes from the Gulf of Nicoya. *C. lentiginosa* must be cancelled as an Australian species.

C. atrata is found under stones at Mossman's Bay, Port Jackson.

Fam. Marginellidæ.

17. Marginella (Glabella) ochracea, Angas, P. Z. S. 1871, Pl. I. f. 6.

A minute triangularly ovate species, of a yellowish colour, with the apex of the spire very obtuse.

From shell-sand, coast of New South Wales (*Brazier*).

18. Hyalina (Volvarina) mustelina, Angas, P. Z. S. 1871, Pl. I. f. 5.

Elongately ovate, banded with grey and brown, and with the outer lip finely dentate within.

Dredged off the "Sow and Pigs," Port Jackson (*Brazier*).

Fam. Naticidæ.

19. Natica areolata, Récluz, P. Z. S. 1843, p. 206.

Painted with finely waved fawn-coloured lines and arrow-headed bands, and sometimes with a row of chestnut spots on a white sutural band, and a second near the base of the last whorl.

Dredged at the "Sow and Pigs," Port Jackson.

20. Natica (Lunatia) incei, Philippi, MS. Mus. Cuming (Brit. Mus.); Reeve, Conch. Icon. *Natica*, pl. 20. f. 89.

Brisbane Water (*Brazier*).

21. Natica (Neverita) conica, Lam. Anim. sans Vert. viii. p. 632; Reeve, Conch. Icon. *Natica*, pl. 12. f. 48.

On the sand-spit at Middle Harbour, Port Jackson.

This is a very abundant species in South Australia.

Fam. Scalidæ.

22. Crossea concinna, Angas, P. Z. S. 1867, pl. xliv. f. 14.

The genus *Crossea* was founded by Mr. Arthur Adams for the reception of two species from Japan. He remarks of these singular and beautiful little shells, "they have perhaps the closest affinity with *Cirsotrema* (Mörch), a genus of *Scalidæ*. They also remind one of *Torinia* and *Conradia*. A great peculiarity consists in the canaliculate angular projection at the fore part of the aperture."

Dredged by Mr. Brazier near the "Sow and Pigs" reef, in Port Jackson, at a depth of from 2 to 4 fathoms.

23. Scala (Cirsotrema) mörchi, Angas, P. Z. S. 1871, Pl. I. f. 7.

Decussated with longitudinal ribs, and more numerous transverse ridges; the former evanescent at the base.

Dredged near the "Sow and Pigs" (*Brazier*).

Fam. Pyramidellidæ.

24. Cingulina spina.

Turritella spina, Crosse et Fisch. Journal de Conch. 1864, p. 347; 1865, p. 44, pl. 3. f. 13, 14.

Dredged at "Sow and Pigs" reef (*Brazier*).

25. Mathilda elegantula, Angas, P. Z. S. 1871, Pl. I. f. 8.

An acuminate semitransparent shell with fourteen whorls, each having three rounded transverse ribs, the interstices finely longitudinally striated.

Dredged in Lane Cove, Port Jackson (*Brazier*).

26. Agatha australis, Angas, P. Z. S. 1871, Pl. I. f. 9.

An opaque white shell, with an acuminate spire and eight whorls, having the columella furnished with a strong spiral plait.

Dredged near the "Sow and Pigs," Port Jackson (*Brazier*).

27. Odostomia simplex, Angas, P. Z. S. 1871, Pl. I. f. 10.

A very small white shell, with a sharp transverse columellar plait, and the outer lip elevately striated within.

Port Jackson (*Brazier*).

28. Syrnola tincta, Angas, P. Z. S. 1871, Pl. I. f. 11.

A small, subulate, smooth, shining shell, irregularly banded and marked with brown, having a single prominent columellar plait.

"Sow and Pigs" (*Brazier*).

Fam. Eulimellidæ.

29. Leiostraca lesbia, Angas, P. Z. S. 1871, Pl. I. f. 14.

A very slender, white, shining species, with a semiopaque band below the suture. Larger and more solid than *L. acutissima*.

"Sow and Pigs" (*Brazier*).

Fam. Cerithiopsidæ.

30. Cerithiopsis clathrata, Angas, P. Z. S. 1871, Pl. I. f. 12.

A beautifully sculptured little species.

Dredged near the "Sow and Pigs" (*Brazier*).

31. Cerithiopsis crocea, Angas, P. Z. S. 1871, Pl. I. f. 13.

Of an orange colour, with four ribs on each whorl, the intercostal spaces finely longitudinally striated.

Dredged off Camp Cove, Port Jackson (*Brazier*).

32. Triforis granulatus, Ad. et Reeve, Voy. Samarang, pl. 11. f. 5.

A small brown shell, with three strongly granulated ribs on each whorl.

Botany Bay.

Fam. Architectonidæ.

33. Torinia straminea, Lam.; Chem. Conch. v. pl. 172. f. 1699.

Broken Bay (*Brazier*).

34. Philippia hybrida.

Solarium hybridum, Lam. Encyc. Méth. pl. 446. f. 5, 6.

White, ornamented with broad pale-brown flames.

Lake-Macquarie beach, New South Wales (*Brazier*).

35. Philippia layardi, A. Ad. P. Z. S. 1854, p. 317.

Flatter and more keeled than the preceding species, with the ground-colour rich brown, ornamented with white on the keel and round the umbilicus.

Lake-Macquarie beach (*Brazier*).

Fam. Terebridæ.

36. Terebra (Hastula) brazieri, Angas, P. Z. S. 1871, Pl. I. f. 15.

This pretty species has the whorls obsoletely plicate and shining, and is irregularly painted with longitudinal orange flammæ. Length 13 lines.

Obtained at Brisbane Water by Mr. Brazier.

Fam. Turritidæ.

37. Pleurotoma violacea, Hinds, Moll. Voy. Sulphur, pl. 5. f. 8.

A pale variety of this species occurs at Broken Bay (*Brazier*).

38. Clathurella hayesiana, Angas, P. Z. S. 1871, Pl. I. f. 17.

A very beautiful species of a chalky-grey colour, and deep purple within; closely longitudinally ribbed, and transversely ridged throughout.

Dredged in Lane Cove, Port Jackson (*Brazier*).

39. Clathurella tenuilirata, Angas, P. Z. S. 1871, Pl. I. f. 18.

Longitudinally ribbed and crossed with narrow, distant, erect ridges, the interstices of which are ornamented with very fine concentric striæ.

Dredged off Goat Island, Port Jackson, in 5 fathoms (*Brazier*).

40. Clathurella sculptilis, Angas, P. Z. S. 1871, Pl. I. f. 19.

This species is elaborately sculptured with strong longitudinal ribs alternating with fine erect striæ, and crossed by concentric somewhat nodulous ridges.

Dredged off the "Sow and Pigs" (*Brazier*).

41. Clathurella bicolor, Angas, P. Z. S. 1871, Pl. I. f. 20.

Of a pale ash-colour, with the base of the last whorl chocolate-brown.

"Sow and Pigs" (*Brazier*).

42. Clathurella bilineata, Angas, P. Z. S. 1871, Pl. I. f. 23.

A small ovate straw-coloured species, white at the aperture, with two narrow brown bands on the last whorl.

Dredged near the "Sow and Pigs" (*Brazier*).

43. Clathurella albocincta, Angas, P. Z. S. 1871, Pl. I. f. 22.

Ovately fusiform, with the last whorl stained with brown, having an opaque white band in the centre.

Dredged near the "Sow and Pigs" (*Brazier*).

44. Clathurella brazieri, Angas, P. Z. S. 1871, Pl. I. f. 21.

Narrowly elongately turreted, pale brown, darker on the lower whorl and at the apex, and with the channel sharply recurved.

Dredged near the "Sow and Pigs" (*Brazier*).

Fam. Conidæ.

45. Conus aplustre, Reeve, Conch. Icon. *Conus*, pl. 30. f. 170.

The figure of this Cone is so bad in Reeve's work as to be scarcely recognizable. The shell is of a light yellowish chestnut, profusely filleted with markings of a darker colour, and with a pale band round the middle of the last whorl. It averages 1 inch in length.

"Bungaree Nora," Broken Bay; Lake Macquarie; Cape Solander, Botany Bay; also from Port Fairy, Bass's Straits (*Brazier*).

46. Conus cooki, Brazier, P. Z. S. 1870, p. 109.

A species 10 lines long, marked with reddish, undulating, longitudinal lines, and somewhat resembling a small non-coronated specimen of the *C. princeps* from Gulf of California. Mr. Brazier found this new Cone amongst the rocks at the spot where Capt. Cook landed at Botany Bay.

47. Conus rossiteri, Brazier, P. Z. S. 1870, p. 109.

Mr. Brazier says of this shell that it is allied to *C. gilvus* of Reeve. I have never seen the specimen; but, from his description, I take it to be in an immature state.

Cape Solander, Botany Bay.

48. Conus rutilus, Menke, Moll. Nov. Holl. p. 57. no. 133.

This pretty little Cone varies in colour from brown to orange, red or purple, and is occasionally freckled with lines and spots. In the South-Australian gulfs I met with it frequently. Mr. Brazier obtained five specimens at Cape Solander, Botany Bay.

Fam. Cypræidæ.

49. Cypræa caurica, Linn.; Lister, Conch. pl. 677. f. 24.
Cape Banks, Botany Bay; Broken Bay (*Brazier*).

50. Cypræa annulus, Linn. Encycl. Méth. pl. 356. f. 7.
Vaucluse Bay, Port Jackson (*Brazier*).

51. Cypræa fimbriata, Gmel.; Wood, Ind. Test. pl. 17. f. 26.
Cape Banks, Botany Bay (*Brazier*).

52. Cypræa lutea, Gronovius, Zoophylacium, pl. 19. f. 17.
C. humphreysi, Gray.
C. commixta, Wood.
Lake Macquarie beach (*Brazier*).

53. Cypræa staphylæa, Linn.; Lister, Conch. pl. 708. f. 58.
Broken Bay (*Brazier*).

54. Cypræa erosa, Linn.; Lister, Conch. pl. 692. f. 39.
Broken Bay (*Brazier*).

55. Cypræa tabescens, Gray; Sow. Conch. Illus. f. 14.
Lake-Macquarie beach (*Brazier*).

56. Cypræa scurra, Chemn. Conch. x. p. 103, pl. 144. f. 1338.
Broken Bay (*Brazier*).

57. Cypræa flaveola, Linn.; Sow. Conch. Illus. f. 11.
The specimens I have seen from the localities recorded beneath I consider to represent the true *C. flaveola* of Linnæus; they differ both from *C. spurca* and *C. gangrænosa*.
Lake Macquarie; Broken Bay; Botany Bay (*Brazier*).

58. Trivia candidula, Gaskoin; Sow. Conch. Illus. f. 149.
"Bottle and Glass" Point, Port Jackson (*Brazier*).

59. Trivia globosa, Gray; Sow. Conch. Illus. f. 34.
Little Bay (*Brazier*).

60. Trivia insecta, Mighels; Sow. in Thesaurus (*Cypræa*), pl. 46. f. 477, 478, 479.
Little Bay (*Brazier*).

Fam. Amphiperasidæ.

61. Amphiperas bulla.
Ovulum bulla, Ad. & Reeve, Voy. Samarang, pl. 6. f. 5.
Port Stephen, New South Wales; also Japan.

62. Amphiperas brevis.

Ovulum breve, Sow. Spec. Conch. f. 26, 27.

Port Stephen, New South Wales.

Fam. Cerithiidæ.

63. Cerithium rhodostoma, A. Ad.; Sow. in Thesaurus, vol. ii. pl. 180. f. 103.

A very pretty species, beautifully sculptured, of a pearly brown colour, the columella rose-coloured.

Lake Macquarie, and "Sow and Pigs," Port Jackson. Mr. Adams's type is from Tasmania.

Fam. Littorinidæ.

64. Littorina scabra.

Helix scabra, Linn. Syst. Nat. p. 1242; Reeve, Conch. Icon. pl. 5. f. 21.

A very abundant species, widely distributed throughout the Indo-Pacific tropical regions. Found by Mr. Brazier attached to the trunks of mangroves in Port Jackson.

65. Fossarina brazieri, Angas, P. Z. S. 1871, Pl. I. f. 24.

A smaller species than *F. patula*, A. Ad. & Ang., rounder in form, of a different sculpture, and more or less variegated with dark brown.

Fam. Rissoidæ.

66. Rissoina crassa, Angas, P. Z. S. 1871, Pl. I. f. 16.

A solid species, strongly longitudinally ribbed, the ribs terminating in nodules at the base of the last whorl.

"Bottle and Glass" rocks, Port Jackson (*Brazier*).

Fam. Neritidæ.

67. Nerita albicella, Linnæus; Quoy, Voy. de l'Astrolabe, iii. pl. 65. f. 17, 18.

Common throughout tropical Australia and the Indo-Pacific province generally.

Rose Bay, Port Jackson (*Brazier*).

68. Neritina (Vitta) rangiana, Récluz, Rev. Zool. 1841.

N. viridis, var. *major*, Rang.

Differs from *N. viridis*, Linn., in the angularity of the last whorl, and in being of a different shade of green, painted with several rows of interrupted dark lines.

Dredged in Port-Jackson Harbour.